IN MEMORIAM

JOHN OSBORN POLAK

MARCH 12, 1870-JUNE 29, 1931

WITH the death of John Osborn Polak on June 29, there passed an outstanding physician, teacher and citizen. He died as he had wished, "on the job"—suddenly, without apparent warning and without bodily pain. He was at the height of his very active and useful career, never more enthusiastic and hopeful in the consummation of the many important problems that he had planned for the future. He had no hobby save his task satisfactorily performed.

If John Polak had a guiding creed it must have been that proposed by Dean Briggs when he said, "Do your work—not just your work and no more, but a little more for the lavishing's sake; that little more that is worth all the rest. And if you suffer as you must, and if you doubt as you must, do your work. Put your heart into it and the sky will clear. Then out of your very doubt and suffering will be born the supreme joy of life."

His stimulating personality and indefatigable ability for work made those associated with him strive to always do better and better work. Leadership was a natural talent of John Polak's. He inspired enthusiasm and stimulated ambition. He commanded respect.

Dr. John Osborn Polak was born in Brooklyn, New York, March 12, 1870. His father was Karl Theodore Polak and his mother Mary Elizabeth Osborn Polak, whose family lived on Clinton Avenue, Brooklyn, for more than 100 years. He married Bertha Louise Pitkin on June 12, 1896—a lovable, kindly and devoted helpmate, ever mindful of his health and comfort—truly a doctor's wife. She died in 1924. One child—a daughter, Mary Osborn Polak—survives.

No citizen of Brooklyn was ever more proud of his "home town" than Dr. Polak. He was always "from Brooklyn" and was ever on the alert for Brooklyn's best interests—medical, educational and civic.

He gave freely of his time and money for the upbuilding of better medicine, higher standards of medical education and better civic conditions throughout the Borough of Brooklyn, and indeed throughout the nation. How he crowded the multiplicity of his interests into the "days of his life" still remains a mystery to those who knew him intimately.

Dr. Polak obtained his education at Rutgers Grammar School and from Rutgers College from which he received the Bachelor of Science degree in 1889 and the Master of Science in 1901. He was graduated in medicine from both the Long Island College Hospital of Brooklyn and the University of Vermont in 1891. He was awarded the Dudley Medal for Surgery upon his graduation from the Long Island College Hospital. Thus Dr. Polak, at the age of 21 years, began his medical career with signal attainments. With such a background it is little wonder that at the age of 61 years he had gained wealth, honor, and fame.

As a physician, Dr. Polak was kind-hearted, lovable, skillful; as an executive, able, equitable, sagacious; as a man, friendly, affable, inspiring—truly a gentleman. He had countless admirers—yes, many friends—all over the world. He was equally well known in the East, West, North and South.

As a teacher he was forceful, explicit, impressive. He had many loyal friends amongst his ex-students. His "boys" were ever dear to his heart. They had received instruction from him; he had received stimulation from them. One of his "boys" wrote in the "1931 Lichonian," the student yearbook of the Long Island College of Medicine, the following—"For twenty-five years his eyes have been directed toward the future while his hand and mind have dealt with the present and his heart has opened to his 'boys.' For twenty-five years he has carried the College on the crest of his fame and he has been the dynamic factor in every advance it has made. For twenty-five years he has sent his students into practice with a confidence born of his teachings. His name and that of the College are synonymous. Where Gynecology and Obstetrics are practiced his name is a byword. His surgical skill is tradition and his teaching is the model for thousands who are emulating him."

The world, unfortunately, is still heavily ladened with "charity patients" and Dr. Polak had his share of these—and more. He radiated sunshine and happiness to countless numbers of poor, tired, sick and unhappy women. He thrilled in their appreciation of his encouragement. Dispensary and ward patients received from him the best he could give. He reveled in their gratitude. No private patient got more of him. Dr. Polak must have believed, with James Allen, that "there is no physician like cheerful thought for dissipating the ills

of the body; there is no comforter to compare with good-will for the dispersing the shadows of grief and sorrow.''

Dr. Polak lived a temperate life. He indulged in no excesses save his work. He died too young—far too young—for he might have accomplished even greater things had he lived through that useful decade just ahead of him. As with Jerome Bell, in the beautiful poem ''Mystery,'' we wonder

> ''What is this mystery men call death?
> My friend before me lies; in all save breath
> He seems the same as yesterday. His face
> So like to life, so calm, bears not a trace
> Of that great change which all of us so dread.
> I gaze upon him and say: He is not dead,
> But sleeps: and soon he will arise and take
> Me by the hand. I know he will awake
> And smile on me as he did yesterday;
> And he will have some gentle word to say,
> Some kindly deed to do; for loving thought
> Was warp and woof to which his life was wrought.
> He is not dead. Such souls forever live
> In boundless measure of the love they give.''
>
> —*Harvey Burleson Matthews.*

Original Communications

THE RELATION OF FORCEPS AND CESAREAN SECTION TO MATERNAL AND INFANT MORBIDITY AND MORTALITY*

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WITH accurate morbidity statistics still unavailable, mortality rates must be the chief criteria by which obstetric practice is judged. Any general improvement in maternity care should be quickly reflected in a reduction of the death rate among mothers, as well as in a lowered incidence of stillbirths and of neonatal deaths. Conversely, stationary rates may be taken to indicate no improvement, and rising rates a falling off in the quality of obstetric practice. Irrespective of our feeling about statistics in general, reliable figures offer the only hope for fair comparison, and deaths are more easily computed than illness.

Official government statistics, as given out from year to year, appear to indicate that there is a rising maternal mortality rate. In 1915, the total puerperal death rate in the Birth Registration Area was 61 per 10,000 live births, while in 1929 this rate had risen to 70. The import of these figures may well be questioned, since the inclusion in the Birth Registration Area during the intervening years of many states having large colored populations would tend naturally toward a higher total rate. However, comparison of the puerperal death rates in the eleven states included in the original 1915 Birth Registration Area (Connecticut, Maine, Massachusetts, Michigan, Minnesota, New Hampshire, New York, Pennsylvania, Rhode Island, Vermont, and the District of Columbia) shows that the rate was slightly higher in 1929 than in the year of the first official statistics (61 as against 65 per 10,000 live births).

It is then at least safe to say that there has been no improvement during the past fifteen years in spite of the facts that (1) progressively more obstetric patients have been given hospital care during parturition, (2) the principles of aseptic and antiseptic technic have been more widely disseminated, and, (3) prenatal care has been developed as a notable experiment in preventive medicine. That these

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*A report made to the White House Conference on Child Health and Protection, Washington, D. C., February, 1931.

factors can serve to lower the maternal mortality rate has been demonstrated in certain metropolitan areas (especially New York City and the Twin Cities of Minneapolis and St. Paul), but that they have failed for the country at large is obvious.

The stillbirth rate for the Registration Area has remained practically constant, while the deaths of infants under one month have declined only slightly and the deaths under one day remain unchanged. For New York, the State Department of Health[2] sponsors the following statement: "The movement of the death rates from causes operative during the first month of life has been less favorable. A considerable reduction was recorded in the mortality from congenital debility and premature birth, the rates being 27.2 in 1915 and 18.9 in 1929. On the other hand, the death rate from congenital malformations remained practically stationary, 5.6 and 5.7, while the rate from injuries at birth increased from 3.9 to 5.5. The total mortality under one month declined, but only 19 per cent, from 41.5 in 1915 to 33.7 in 1929. It is interesting to note that there has been practically no change in the relative number of deaths under one day." The increased number of early infant deaths recorded as due to birth injuries is confirmed by Frankel,[3] who states that the increase has averaged 5 per cent per year, a 44 per cent increase from 1915 to 1929. Rodda[4] reports that more than 50 per cent of early infant deaths and stillbirths are associated with intracranial injuries as shown by postmortem, and Bolt[5] says: "From 40 to 50 per cent of neonatal deaths reveal intracranial hemorrhages at autopsy."

Fahlbusch[6] reports that neonatal deaths (first four days of life) are also increasing in various sections of Germany as follows:

Section	Neonatal Deaths (Per Cent)	
	1907	1924
Prussia	2.23	2.55
East Prussia	1.79	1.96
Westphalen	2.38	2.94
Rhine	2.42	2.84

and attributes the increase to the fact that more women are engaged in the industries.

From the general experience in this country, it is logical to conclude that prenatal supervision, improved aseptic technic, and hospitalization for delivery are either ineffective in conserving the life and health of mother and child, or that other factors are obscuring the good results that might otherwise have been evident. The most striking change in obstetric practice in the past decade and a half has been the marked relaxation in indications for intervention during labor and the great increase in operative deliveries. Little effort has been directed toward determining whether such interference actually marks an advance, although conservative thought has always opposed in-

tervention as being more dangerous to mother and child, on the theory that childbearing is essentially a normal physiologic process. A certain few of the old school have raised their voices on every occasion against the tide of radicalism, but apparently without stemming its rise.

Attempts to evaluate the factors leading up to this operative furor are apt to be incomplete, but it would seem reasonable to include the following as representing the most important:

1. The (often false) sense of security engendered by the use of modern antiseptics.

2. The almost universal employment of anesthetics.

3. An exaggerated idea of the value of an infant's life as compared to the life and health of its mother.

4. The demand on the part of obstetric patients for shorter and more comfortable labors.

5. Extension of the indications for operative induction or termination of labor to include the convenience of the patient, husband, doctor, or other person.

6. The education of the laity to a higher scale of fees for operative procedures, although often the value of services in nonoperative deliveries is much greater.

Other factors undoubtedly enter the picture and serve to confuse it, but the fact remains that there has been a tremendous increase in operative deliveries, especially in hospital practice, a change which may well be responsible for our failure to make any progress in the fight against the deplorable loss of life among mothers and newborn infants. If a mother can be spared pain without prejudicing her life or health or that of her child, and if a child's life can be saved without placing the mother in too great danger, the new obstetric conscience is admirable, but if the reverse is true, the older conservative obstetrics would seem better.

The purpose of the present report is to evaluate as accurately as possible the effects of forceps delivery and cesarean section on the life and health of the mother and her child. The enormous mass of data available presents a serious problem of selection, which is further complicated by the fact that statistics are presented from such divergent points of view that correlation is extremely difficult. Particular attention will be paid to the more recent reports.

THE RELATION OF MATERNAL DEATHS TO THE TYPE OF DELIVERY

The mere fact that many deaths after delivery (excluding cases where pregnancy has not advanced to 7 calendar months) occur after the artificial termination of labor does not necessarily implicate the mode of delivery, since operative intervention is commonly more necessary in complicated cases. Recent Children's Bureau statistics[7]

show that among 4,965 maternal deaths, occurring in women seven months or more pregnant, data on the method of delivery are available in 4,839, of whom 2,225 (46 per cent) died after an operation aiming at delivery. Seven hundred and ninety-nine (16.5 per cent) succumbed after forceps, and 531 (11.0 per cent) following cesarean section.

RELATION OF MODE OF DELIVERY TO VARIOUS CAUSES OF DEATH

TABLE I.   FROM CHILDREN'S BUREAU DATA COVERING 4,965 PUERPERAL DEATHS FOLLOWING DELIVERY AT SEVEN MONTHS OR MORE[7]

	CAUSE OF DEATH	NO OBSTETRIC OPERATION		FORCEPS		CESAREAN SECTION	
		NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
143	Accidents of pregnancy	116	4.45	5	0.63	3	0.56
144	Puerperal hemorrhage	275	10.55	132	16.52	41	7.72
145	Accidents of labor						
	A. Cesarean section	---	----	---	----	134	25.24
	B. Other operations	---	----	76	9.51	---	----
	C. Other accidents of labor	278	10.66	50	6.26	10	1.88
146	Puerperal septicemia	901	34.56	215	26.91	141	26.56
147	Phlegmasia alba dolens, etc.	206	7.90	51	6.38	1	0.19
148	Puerperal albuminuria and convulsions	813	31.19	268	33.54	201	37.85
149	Following delivery, not specified	18	0.69	2	0.25	0	0.00
150	Diseases of the breast (puerperal)	---	----	--	----	--	----
	Totals	2,607	100.00	799	100.00	531	100.00

The high percentage of "toxemia" deaths in the operative groups is worthy of note in view of the accumulated evidence to show that the conservative treatment of eclampsia is productive of better results than is immediate operative emptying of the uterus. The higher percentage of deaths due to infection (No. 146) after spontaneous labor should not be misinterpreted as indicating the relative safety of operative delivery in this connection. Obviously, the total number of spontaneous deliveries was far greater than the number of operative terminations, and, moreover, the number of deaths due directly to the operation is sufficient in either case to bring the total (No. 145 plus No. 146) above that for sepsis deaths after spontaneous labor.

Data for Wisconsin for 1927 and 1928, as reported by Calvert,[8] show the type of delivery in 427 fatal cases out of 446 where the pregnancy had proceeded to viability of the child. In these 427 patients, operative intervention had been practiced in 70.1 per cent. Ninety-two deaths (21.5 per cent) followed forceps applications, and 67 (15.7 per cent) occurred after cesarean section.

In Massachusetts, in 1921, there were 525 maternal deaths, 87 being associated with delivery by cesarean section.[9] Among 370 deaths among primiparous women analyzed by the State Board of Health of Massachusetts, 233 had been delivered by operation, 116 by cesarean section and 106 by forceps.

It is conceded that a radical increase in the number of operative deliveries is not followed by a corresponding rise in the death rate,

since, obviously, operations of convenience are less dangerous than those of necessity. However, it is generally admitted that interference with normal labor is accompanied by some added risk to both mother and child, although Little[10] ". . . . cannot accept the English view that cases delivered with forceps are more liable to infection than those delivered spontaneously"; while Bill[11] says ". . . ., there was no more morbidity during the period when with proper technic more operative work was done than during the period covered by the first (conservative) series." This is decidedly a minority opinion, which is cited to indicate that there is some opposition to the older established view. No one denies that febrile convalescence is more common after cesarean section than after spontaneous labor, the above statements applying only to "convenience" forceps.

FORCEPS DELIVERY

Until comparatively recently, the forceps was used very infrequently, and then only when the mother was unable to deliver herself, fetal indications not being recognized. The old doctor knew how to sit and wait, and the number of spontaneous deliveries he had was astounding, one elderly physician, who had always practiced in rural communities, boasting that he had used instruments only four times in more than 3,000 deliveries during a practice of over fifty years. By contrast, there are now a few clinics in this country where the application of forceps is routine, except where a precipitate delivery interferes with the obstetrician's plans. In the former, obvious indications must have been overlooked, whereas in the latter much absolutely needless interference is being practiced.

There is no general agreement as to what constitutes a reasonable indication for instrumental delivery, although more commonly it is said that interference should be practiced only "when an indication exists." Delay in the second stage is generally taken to indicate instrumentation, but opinions differ widely as to what constitutes significant delay, while certain other maternal conditions, such as cardiac disease, pregnancy toxemia, and tuberculosis, are looked upon as justifying interference. From the standpoint of the fetus, prolapse of the cord is quite alone as a completely accepted indication, although Ehrenfest[12] states that 70 per cent of all forceps deliveries are done on fetal indications, fetal distress being assumed from variations in the fetal heart tones. There is, however, a growing suspicion that the fetal heart sounds do not faithfully reveal the condition of the fetus, and that changes in their rate do not justify the adoption of radical methods of delivery. Esch[13] points out that if excessive compression of the head is considered responsible for the signs supposedly indicative of fetal distress, further compression of the head by forceps can only be detrimental to the child. The fact that so many children

survive such instrumentation is evidence enough that the condition is not serious. More recently, in Germany especially, complete anesthesia of the mother has been substituted for rapid delivery in assumed fetal distress with gratifying results.[13] When fetal indications, except prolapsed cord, are ignored, there is no appreciable increase in stillbirths or in neonatal mortality, that can be attributed to lack of interference.[14] This would make it seem that the good derived from active intervention is at least balanced by the pernicious effects of that practice. Ehrenfest[15] remarks that "there is no acceptable proof extant for the assertion that forceps extraction is less dangerous to the infant than a long labor."

THE INCIDENCE OF FORCEPS DELIVERY

In response to the White House Conference questionnaire[20] concerning deliveries during 1929, 207 representative general hospitals having obstetrical services reported 120,999 deliveries with 21,097 forceps, an incidence of 17.4 per cent; while 16 special obstetric, or obstetric and gynecologic, hospitals reported 24,813 deliveries with 5,075 forceps, an incidence of 20.4 per cent. For the entire 223 institutions, there were 145,812 deliveries with 26,172 forceps, 17.9 per cent, one forceps in 5 or 6 deliveries. Among the general hospitals, the incidence varied from 0.5 per cent (1 forceps in 218 deliveries) to 81.1 per cent (99 forceps in 122 deliveries); while in the 16 special institutions, the spread was from 3.8 per cent (24 forceps among 635 deliveries) to 50.4 per cent (808 forceps in 1,602 deliveries).

In 127 of the 223 hospitals, the forceps incidence was not above the average for the entire group, 17.9 per cent; while in 87.5 per cent less than 30 per cent of all deliveries were instrumental. The fact that 6 institutions admit an incidence of over 50 per cent is interesting, but it is perhaps more significant that five of these hospitals are in Ohio, and one in West Virginia. Table II shows the distribution of the hospitals according to the reported incidence of forceps delivery.

TABLE II. PERCENTAGE INCIDENCE OF FORCEPS IN REPORTING HOSPITALS

PER CENT OF FORCEPS DELIVERIES	NO. OF HOSPITALS	PER CENT OF HOSPITALS
0- 9.9	69	**31.1**
10.0-19.9	74	32.8
20.0-29.9	53	23.6
30.0-39.9	17	7.6
40-0-49.9	6	2.7
50.0-59.9	2	0.9
60.0-69.9	2	0.9
70.0-79.9	1	0.4
80.0-89.9	1	0.4

Since the data permitted grouping the reporting hospitals according to their location, the following table was prepared to cover the states which reported more than 5,000 deliveries.

TABLE III.   FORCEPS INCIDENCE IN VARIOUS STATES

STATE	DELIVERIES REPORTED	FORCEPS DELIVERIES	
		NO.	PER CENT
Ohio	9,856	3,417	34.7
Massachusetts	13,994	3,442	24.8
New York	34,268	6,533	19.1
Pennsylvania	11,018	1,276	12.7
California	8,275	1,920	17.4
Illinois	14,055	1,172	14.2
Michigan	10,022	1,885	13.4
New Jersey	5,467	568	10.4

When the data from the entire number of reporting hospitals are arranged according to recognized state groups, Table IV appears:

TABLE IV.   PERCENTAGE INCIDENCE OF FORCEPS ACCORDING TO STATE GROUPS

STATE GROUP	NO. OF HOSPITALS	NO. OF DELIVERIES	NO. OF FORCEPS	PER CENT OF FORCEPS
New England States (Me., Vt., N. H., Mass., Conn., R. I.)	25	18,717	4,182	22.3
Middle Atlantic States (N. Y., N. J., Pa., Del., Md., D. C., Va., W. Va.)	87	57,463	9,925	17.3
East Central States (Mich., Wis., Ill., Ind., Ohio, Ky.)	53	39,641	7,371	18.6
West Central States (Minn., N. Dak., S. Dak., Neb., Ia., Kan., Mo.)	17	6,770	1,061	15.7
East Southern States (Tenn., N. C., S. C., Ga., Ala., Miss., Fla.)	14	6,340	848	13.4
West Southern States (Okla., Ark., Texas, La.)	10	4,953	1,022	20.6
Southwestern States (Colo., Utah, Nev., Calif., Ariz., N. Mex.)	12	9,009	1,200	13.3
Northwestern States (Wash., Ore., Mont., Idaho, Wyo.)	5	2,919	560	19.2

Such figures are indicative of the frequent use of forceps but give no evidence concerning the incidence as compared with the past.

TABLE V.   FORCEPS INCIDENCE IN THE HARTFORD GENERAL HOSPITAL[21]
1916 TO 1928

YEAR	NO. OF DELIVERIES	NO. OF FORCEPS	PER CENT OF FORCEPS
1916	985	68	6.9
1917	1,026	69	6.7
1918	848	86	10.1
1919	970	94	9.7
1920	979	90	9.2
1921	794	76	9.6
1922	881	91	10.3
1923	1,114	116	10.4
1924	1,154	147	12.7
1925	1,285	157	12.2
1926	1,377	165	12.0
1927	1,411	189	13.4
1928	1,507	243	16.1

James R. Miller, of Hartford, Connecticut, has provided figures for the Hartford General Hospital covering the thirteen years up to 1928. These data are placed in tabular form. It may be assumed that this table represents conditions in many institutions, although in certain hospitals the rate of increase was undoubtedly more rapid.

Since no figures are available in the literature for the forceps incidence in practice outside hospitals, an attempt was made to secure such data from practitioners in Iowa in two ways: First, from birth certificates,[22] which, since April 1, 1930, have included a question concerning the method of birth, and second, from a questionnaire[23] distributed among the members of the writer's postgraduate classes during the past winter. In the latter instance, many of the figures are admittedly approximations, but in spite of this inherent inaccuracy they are included for comparison.

Among 19,675 birth certificates,[22] forceps were specified 678 times, an incidence of 3.45 per cent. In cities of over 10,000 population, there were 6,502 births with 324 forceps, 4.99 per cent; while among 13,173 deliveries in communities of less than 10,000 population, including a great majority of home deliveries, there were only 354 forceps, 2.69 per cent.

The approximate data obtained from 70 questionnaires[23] covered 42,394 deliveries, of which more than 91 per cent were conducted in the home. There were 3,235 forceps operations, an incidence of 7.6 per cent.

The apparent discrepancies between the two sets of figures may be explained partly by the fact that in the birth certificate data there were 1,224 cases in which the type of operative delivery was not specified. At any rate such figures would indicate that in general practice the forceps is used in something less than 10 per cent of all cases.

European obstetricians have been more inclined to conservatism than have American operators, and have given serious thought to the forceps incidence consistent with the best results. Heinlein[16] is of the opinion that the optimum incidence for instrumental delivery is 2 to 3 per cent, while Pritzi[17] names 3.5 per cent. Thurn-Rumbach[18] reports 37,643 deliveries with a forceps incidence of 2.31 per cent and a total fetal mortality (exclusive of macerated fetuses) of 4.01 per cent, while Santner,[19] with 21,140 deliveries and a total forceps incidence of 0.82 per cent, had a total fetal death rate of 2.37 per cent, a better figure than can be found in a comparable series where the forceps incidence was higher.

In general, the recorded incidence of forceps deliveries in foreign clinics is decidedly lower than those presented from representative hospitals in this country.

Such data could be multiplied many times, but their inclusion would merely emphasize the fact that when forceps is limited to actual need, on the basis of maternal indications, instrumental delivery is uncommon, and probably represents not more than 5 per cent of any given consecutive series. Any great increase over this figure savors of meddlesome midwifery.

TABLE VI.   FORCEPS INCIDENCE IN FOREIGN CLINICS

AUTHOR	PERCENTAGE OF FORCEPS
Tottenham[24]	2.7
Jaschke[25]	4.8
Pritzi[17]	2.96
Klaften and Bodnar[26]	3.0

MATERNAL MORBIDITY AFTER FORCEPS DELIVERY

Morbidity following forceps delivery, as based upon postpartum elevations of temperature and upon physical injury, depends particularly upon the type of forceps (low, mid, or high), although other factors, such as the skill of the operator, the surroundings under which he works, and the initial indication play a considerable rôle. The higher the presenting part at the time of the application, the greater the risk of injury and infection, with the former being a prominent precursor of the latter. Convenience indications carry a considerably less risk than do actual maternal indications. The few concrete figures available show conclusively that postpartum fever is more common following forceps for genuine indications than after spontaneous delivery, with comparable figures not available for "convenience" forceps. However, Schoeneck,[27] whose forceps incidence is high, remarks: "The morbidity in spontaneous labors was less than in delivery by prophylactic forceps or version; lacerations of the birth canal were lessened in incidence and degree; and the maternal and fetal mortality were nil." Representative morbidity figures based upon elevations of temperature are recorded; obviously the percentages will vary depending upon the frequency with which the temperature is taken and with the point chosen as being abnormal. In these instances temperatures were taken every four hours and any elevation above 100.4° F. placed the patient in the febrile group.

TABLE VII.   FEBRILE CONVALESCENCE AFTER FORCEPS DELIVERY

NAME	PLACE	PERCENTAGE MORBIDITY		
		LOW FORCEPS	MID FORCEPS	HIGH FORCEPS
Peterson[28]	Ann Arbor	35.2	36.4	53.8
Plass	Iowa City	29.0	42.2	50.0
Plass	Detroit	28.0	33.0	33.0

Stander[29] in analyzing 1,000 consecutive forceps deliveries noted that the puerperium was febrile in 354, 35.4 per cent. He does not differentiate between the various types of operation.

MATERNAL MORTALITY AFTER FORCEPS DELIVERIES

The maternal mortality following forceps delivery, as obtained from the nation-wide questionnaire,[20] is surprisingly low, possibly because deaths from other causes in patients delivered by forceps were placed in other categories. At any rate, 116 hospitals reported on this item, listing 11,189 forceps deliveries with only 36 maternal deaths, a mortality incidence of 0.32 per cent. This does not correlate well with data previously cited showing that from 10 to 25 per cent of patients dying after delivery of viable children had been delivered by forceps. However, other available figures indicate that the mortality is low: Duncan[30] records 886 forceps with no maternal death, Schoeneck[27] did 241 forceps without maternal mortality, Peterson[28] reports 3 maternal deaths among 293 forceps, and I have had 3 deaths in 255 forceps deliveries. Stander[29] records a gross maternal mortality of 1.1 per cent in 1,000 forceps cases. The Iowa questionnaire[23] showed 21 deaths among 3,235 forceps deliveries, 0.65 per cent. King[31] reports 8 deaths among 150 consecutive forceps at the Charity Hospital, New Orleans, all except possibly two being in neglected cases admitted as emergencies.

Available figures from Europe include:

TABLE VIII.   MATERNAL MORTALITY AFTER FORCEPS (EUROPE)

AUTHOR	NO. OF FORCEPS	PERCENTAGE MORTALITY
Martin and Spieckhoff[32]	630	0.7
Neumann[33]	132 (Kielland)	2.3
Pritzi[17]	920	2.2
Klaften and Bodnar[26]	312	3.9
Jaschke[25]	308	2.3

In comparing the rates from this country and Europe, it should be kept in mind that the "convenience" forceps is essentially an American institution, and that its death risk is admittedly low.

Statistics from large groups of the population abroad also show that the mortality incident to forceps delivery is not especially high. Among 23,729 operative deliveries in Norway from 1910 to 1918, there were 18,265 forceps with 122 maternal deaths, 0.67 per cent, while in Baden from 1900 to 1909, the maternal death rate after forceps was 0.6 per cent, and in Bavaria from 1901 to 1906 it was 1.3 per cent.

TABLE IX.   THE RELATIVE INCIDENCE OF LOW, MID, AND HIGH FORCEPS, AND THE CONSEQUENT MATERNAL MORTALITY

AUTHOR	LOW FORCEPS		MID FORCEPS		HIGH FORCEPS	
	INCI-DENCE	MOR-TALITY	INCI-DENCE	MOR-TALITY	INCI-DENCE	MOR-TALITY
Stander[29]	5.4	...	0.9	...	0.12	...
Duncan[30]	13.5	0.0	7.6	0.0	0.8	0.0
Klaften and Bodnar[26]	1.6	3.7	0.33	2.9	0.1	10.0
Peterson[28]	...	0.0	...	0.0	...	23.0
Iowa questionnaire[23]	4.7	0.5	2.3	0.7	0.56	1.7
Plass (Iowa City)	5.7	1.1	2.3	1.4	0.26	0.0
Plass (Detroit)	7.7	1.1	1.3	0.0	0.3	0.0

It is generally admitted that the risk to the mother is less as the presenting part is lower in the pelvis when the forceps application is made, but actual figures on the relative incidence of low, mid, and high forceps, and the consequent maternal mortality are not plentiful. Table IX gives the data collected on these points.

No data are available for clinics with high rates of interference, but it may be assumed that the increase is largely in the low forceps group and that the maternal mortality is increased little or none.

FETAL MORBIDITY AND MORTALITY AFTER FORCEPS

It is impossible to determine the immediate morbidity of the child after an instrumental birth, but such injuries as facial paralysis, superficial abrasions, and nonfatal intracranial hemorrhages are recognized as being more common than after spontaneous birth. The later results have been studied, especially by Wetterdal,[35] who concludes that mid and high forceps ". . . . have been shown to be associated with much greater risk for the child by way of serious mental defects than is the case with those spontaneously delivered or with children delivered by low forceps." His data may be summarized as shown in Table X.

TABLE X.　LATE RESULTS OF FORCEPS BIRTH, WETTERDAL*

	2,000 SPONTANEOUS BIRTHS		1,624 LOW FORCEPS		285 MID FORCEPS		91 HIGH FORCEPS	
	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
Died in hospital	51(2,000)	2.55	117(1,624)	7.2	41(285)	14.4	28(91)	30.8
Died after discharge	270(1,721)	15.7	196(1,298)	15.1	42(210)	20.0	11(60)	18.3
Well at 12 years	1,248(1,721)	72.5	973(1,298)	75.0	138(210)	65.7	39(60)	65.0
Mentally defective	113(1,721)	6.6	76(1,298)	5.9	21(210)	10.0	8(60)	13.3
Physically defective	90(1,721)	5.2	53(1,298)	4.1	9(210)	4.3	2(60)	3.3

*The figures in parentheses indicate the number of total cases used for computing the percentages.

More data are available upon the stillbirth rate and upon the total infant mortality following forceps, to indicate that these rates are generally higher than in spontaneous births. Ehrenfest[36] says, "Serious and fatal lesions occur frequently in the course of spontaneous and easy labors, especially in premature infants, but are more common after forceps. . . ." The death rate depends upon the type of operation (low, mid, or high), and upon the skill of the operator and the facilities which he can command, as well as upon the indication. The actual infant mortality should be higher when intervention is practiced only upon clean-cut indications than when it is done merely as a convenience, in patients who would otherwise deliver themselves within a short period. Obviously then, a reduced percentage of infant

deaths in forceps deliveries where the operative incidence is high does
not argue that operative intervention is safest for the child, but
rather that "convenience" forceps is not especially severe upon the
newborn.

TABLE XI. TOTAL INFANT MORTALITY FOLLOWING FORCEPS

AUTHOR	ALL FORCEPS	LOW FORCEPS	MID FORCEPS	HIGH FORCEPS
(United States and Canada)				
Peterson (Ann Arbor)[28]	3.1	1.7	7.4	61.5
Iowa questionnaire[23]	8.1	4.6	9.3	32.8
King (New Orleans)[31]	18.7	--	--	--
Stander (Baltimore)[29]	10.0	--	--	--
Duncan (Montreal)[30]	4.7	1.1	8.1	31.4
Carroll (Toledo)[37]	--		10.0	13.3
Plass (Iowa City)	5.5	5.7	5.6	0.0
Plass (Detroit)	7.4	2.2	33.3	33.3
(Foreign Clinics)				
Wetterdal[35]	9.3	7.2	14.4	30.8
Klaften and Bodnar[26]	16.3	14.2	23.5	50.0
Jaschke[25]	10.4	--	--	--
Martin and Spieckhoff[32]	8.2	--	--	--
Neumann (Kielland forceps)[33]	6.1	--	--	--
Pritzi[17]	11.6	--	--	--
Gauss[38]	10.3	--	--	--
Baisch[39]	--	--	--	43 to 50

The excessive infant death rate following high forceps furnishes a
striking argument against the performance of this operation except
under unusual circumstances. It is, however, doubtful whether, with
the presenting part high and a definite maternal indication for deliv-
ery, version and extraction offers much better chances for the child,
and certainly under these conditions the danger to the mother of
cesarean section would be great. In fact, a satisfactory method for
handling these difficult cases has not yet been devised.

Study of 591 stillbirths in Iowa[22] reveals that 419 followed sponta-
neous labor, while in 172 instances the mother had been delivered by
operation, according to Table XII:

TABLE XII. STILLBIRTH INCIDENCE ACCORDING TO METHOD OF DELIVERY
IOWA BIRTH CERTIFICATES—APRIL 1 TO SEPTEMBER 30, 1930

METHOD OF DELIVERY	NUMBER OF DELIVERIES			STILLBIRTH RATE PER CENT		
	URBAN*	RURAL	TOTAL	URBAN	RURAL	TOTAL
Spontaneous	5,651	11,983	17,634	2.37	2.38	2.37
Operative	851	1,190	2,041	5.52	10.50	8.43
Low forceps	215	207	422	0.9	6.3	3.5
Mid forceps	65	64	129	1.5	3.1	2.3
High forceps	44	83	127	9.0	9.7	9.4
Cesarean section	77	62	139	6.5	11.3	8.4
Operation not specified	450	774	1,224	7.8	12.3	10.6
Total	6,502	13,173	19,675	2.78	3.11	3.00

*Urban is used to designate communities of more than 10,000 population.

It should be noted that while the operative incidence in the urban
communities was higher than in the rural districts (13.47 to 9.04 per

cent), the stillbirth rate following operation was only one-half as great (5.52 to 10.50 per cent), undoubtedly indicating a greater number of actual indications in the latter, as well as less favorable conditions for delivery.

CESAREAN SECTION

Perhaps the most striking evidence of the present operative furor in obstetrics is furnished by the cesarean section incidence, which has increased many times in the past generation by reason of the gradual relaxation of the indications for its performance. Previously, abdominal delivery was done only for a certain few reasons (contracted pelvis, obstructed birth canal, and maternal conditions such as uncompensated cardiac disease), which are encountered with relative infrequency. These still remain the only undisputed indications, but the range of employment of the operation has been extended until it includes every imaginable complication of pregnancy and labor. In still other cases, the desire of the patient for abdominal delivery has been the deciding factor, and even mere convenience must enter the picture to explain the high incidence reported by some clinics. The commonly accepted dictum, "Once a cesarean, always a cesarean," constantly replenishes the fire of the operative orgy. Conservative obstetricians, who support this working rule of abdominal delivery where it has been done previously, find that quite one-half of their cesarean sections are performed because of a previous abdominal delivery done for conditions which are not apparent at the time.

The newer indications, excepting those in the "convenience" group, should almost without exception be classed as "fetal," since the only reason for their performance is that they increase the chances for living children. Gauss[38] comments as follows upon the validity of such "fetal" indications: ". . . . a section done for a fetal indication, i.e., placenta previa or eclampsia, is not justified because the life of a single child (except in very exceptional cases) is nothing compared to preserving the health, fertility, and the ability to bear child in a natural way, of the parturient woman," but the majority of obstetricians, especially in this country, have succumbed to the "exaggerated idea of the value of an infant's life as compared to the life and health of its mother."

THE GENERAL INCIDENCE OF CESAREAN SECTION

Figures taken from hospital records obviously give little information about the incidence of cesarean section in communities as a whole, since practically all abdominal deliveries are done in institutions, whereas a large proportion of other deliveries are conducted in the home. Accurate figures for certain large cities and for one state are, however, available to show the number of cesarean sections in relation to the total number of deliveries. (Table XIII.)

TABLE XIII.   CESAREAN SECTIONS IN RELATION TO TOTAL DELIVERIES

CITY OR STATE	AUTHOR	TOTAL DELIVERIES	TOTAL CESAREAN SECTIONS	PERCENTAGE CESAREAN SECTIONS
Detroit	Welz[40]	33,480	154	0.46
Hartford	Miller[41]	76,502	674	0.88
New Orleans	Gynec. & Obst. Soc.[42]	61,966	300	0.48
Massachusetts	DeNormandie[43]	90,904	1,161	1.28

The Iowa questionnaire[23] showed an incidence of cesarean section
of 0.38 per cent among 42,394 deliveries; while evidence from Iowa
birth certificates[22] showed an incidence of 0.70 per cent, with 1.22 per
cent among 6,502 urban deliveries as against 0.47 per cent in 13,173
rural cases.

By contrast, it is reported[34] that in Norway, in 1917-1918, only 0.15
per cent of all confinements were completed by cesarean section, while
Ilkevich, Selicky, and Levy[44] record 309,468 deliveries in Moscow dur-
ing 1921 to 1927, with 743 cesarean sections, an incidence of 0.24 per
cent.

CESAREAN SECTIONS IN HOSPITAL DELIVERIES

The questionnaire[20] sent to hospitals in this country by the White
House Conference was completed by 104 general hospitals with ob-
stetric wards and by 15 special obstetric and gynecologic institutions,
as to the total number of cesarean sections done in 1929.

TABLE XIV.   TOTAL CESAREAN SECTIONS IN 119 U. S. HOSPITALS

	TOTAL DELIVERIES	TOTAL CESAREAN SECTIONS	PERCENTAGE CESAREAN SECTIONS
104 general hospitals	69,422	2,023	2.9
15 special hospitals	24,813	691	2.9
Total	94,235	2,714	2.9

The incidence among the reporting hospitals varied from a fraction
of 1 per cent to 14.6 per cent (190 cesarean sections in 1,302 deliveries).

When these hospital data are arranged according to the location of
the institutions some interesting facts appear.

TABLE XV.   CESAREAN SECTION INCIDENCE ACCORDING TO GEOGRAPHIC LOCATION

STATE GROUP	NO. OF HOSPITALS	NO. OF DELIVERIES	NO. OF CESAREAN SECTIONS	PER CENT OF CESAREAN SECTIONS
	113 U. S. HOSPITALS			
New England States	18	15,532	520	3.3
Middle Atlantic States	45	37,734	1,143	3.0
East Central States	24	21,287	446	2.1
West Central States	7	3,125	46	1.5
East Southern States	7	4,989	86	1.7
West Southern States	3	1,742	61	3.5
Southwestern States	8	6,405	240	3.7
Northwestern States	1	826	27	3.3

Other reports from single hospitals and groups of hospitals confirm these incidence figures and indicate that cesarean sections are becoming very common in the majority of institutions, although there is an occasional marked exception, as in Tiber's[49] report covering three hospitals in Minneapolis and St. Paul.

TABLE XVI. ADDITIONAL FIGURES ON HOSPITAL INCIDENCE OF CESAREAN SECTION

AUTHOR	LOCATION	NO. OF DELIVERIES	CESAREAN SECTIONS NO.	PER CENT
Thompson[45]	Los Angeles	33,873	1,429	4.2
Ronsheim and Daichman[46]	Brooklyn	24,217	565	2.3
Duncan[30]	Montreal	4,025	178	4.4
Carroll[37]	Toledo	883	18	2.0
Sage[47]	Omaha	2,510	44	1.7
Smith[48]	Indianapolis	2,033	106	5.2
Tiber[49]	Minneapolis-St. Paul	26,885	70	0.26

Figures from two institutions may be quoted to indicate how the incidence of abdominal delivery has increased during the past several years.

TABLE XVII. YEAR-BY-YEAR INCIDENCE OF CESAREAN SECTIONS IN TWO HOSPITALS

YEAR	CHICAGO LYING-IN HOSPITAL GREENHILL[50]			HARTFORD GENERAL HOSPITAL MILLER[41]		
	TOTAL DELIVERIES	CESAREAN SECTIONS NO.	PER CENT	TOTAL DELIVERIES	CESAREAN SECTIONS NO.	PER CENT
1916-17	2,134	20	0.9	985	24	2.4
1917-18	2,895	32	1.1	1,026	29	2.8
1918-19	3,393	42	1.2	885	20	2.3
1919-20	3,268	43	1.3	970	35	3.6
1920-21	3,362	46	1.4	979	33	3.4
1921-22	3,683	65	1.8	794	29	3.7
1922-23	3,886	78	2.0	881	37	4.2
1923-24	4,042	100	2.5	1,114	68	6.1
1924-25	4,312	119	2.8	1,154	46	4.0
1925-26	4,350	119	2.7	1,285	39	3.0
1926-27	4,307	113	2.6	1,377	60	4.3
1927-28	4,658	128	2.7	1,411	67	4.8
1928-29	4,603	139	3.0	1,507	65	4.3

The type of cesarean section reported by the various hospitals is of interest in view of the efforts being made to popularize the low (cervical) operation. Among the general hospitals, there were 2,748 classical sections as against 546 of the low variety (5 to 1); whereas the special institutions reported 388 classical and 303 cervical operations (1.3 to 1). By contrast, Winter's[51] statistics for Germany in 1928 showed 438 classical as against 3,354 cervical operations (1 to 7.7).

Individual foreign clinics show a wide variation in the total incidence of cesarean section, with little or none of the tendency toward excessively high rates reported in this country.

TABLE XVIII.   CESAREAN SECTION INCIDENCE IN FOREIGN CLINICS

AUTHOR	TOTAL DELIVERIES	TOTAL CESAREAN SECTIONS	PER CENT OF CESAREAN SECTIONS
Stockholm Lying-In Hospital (quoted by Kosmak[55])	3,148	2	0.06
Tottenham[24]	1,576	2	0.13
Lehoczky-Semmelweiss[52]	24,793	128	0.52
Pritzi[17]	31,053	343	1.1
Wille[54]	28,917	357	1.2
Hirsch[53]	4,129	101	2.4
Schweitzer (quoted by Hirsch[53])	7,070	236	3.3
Jaschke[25]	6,458	253	3.9

In 1928, Hirsch[53] urged the more frequent use of abdominal delivery in a statement which includes the following: "The mother's chances in delivery by cesarean section are today better than by the competing methods of vaginal delivery." This statement precipitated many adverse opinions with very little support. Winter,[51] arguing against such radicalism, used certain collected German statistics for 1928, and reviewed 4,450 abdominal deliveries with a total maternal mortality of 7.1 per cent, and a mortality due to the operation itself of 4.2 per cent. Essen-Möller[56] also takes a strong stand against Hirsch's view, saying: "No; surgical intervention is not intended to shorten a physiologic process, nor merely to alleviate it. It is permissible only after thorough consideration of the *pros* and *cons*." Gauss[38] especially decries abdominal delivery for fetal indications, and includes in the latter eclampsia and placenta previa, where equally good results for the mother can be obtained by delivery from below, but where cesarean section admittedly reduces the fetal death rate.

MATERNAL MORBIDITY FOLLOWING CESAREAN SECTION

Maternal morbidity, as expressed in terms of fever after delivery, is considerably increased after cesarean section as compared with spontaneous delivery. Different morbidity standards make it difficult to compare the reports from various clinics, but a summary of the published results leads to the belief that from 20 to 65 per cent of patients having an abdominal delivery have a temperature above 100.4° F. during convalescence. Another direct result of the operation which should be considered in the light of a disability concerns itself with the scar in the uterus. The line of incision commonly represents a weakened area with consequent danger of rupture in subsequent pregnancies and labors. With the classical incision, this danger is usually given as 4 per cent, with the risk after the cervical section probably somewhat less, but nevertheless definite. The fear of another pregnancy with a second operation should also be viewed as a disability. When the operation is done for incidental indications, the risk of subsequent operations should really be charged against the initial procedure.

MATERNAL MORTALITY FOLLOWING CESAREAN SECTION

The chief argument against abdominal delivery is its associated mortality.

Paine[57] states that "Cesarean section is recognized as having in itself the highest maternal mortality of any delivery operation." Another adverse argument is advanced by Essen-Möller,[56] who stresses ". . . the fear of the mother after cesarean section that she may become pregnant again, and the significance such a state of mind may possibly have for the population." Hellmuth[58] followed 112 patients who had had 133 cesarean sections, and found that after the first operation 30 per cent remained sterile, while after the second cesarean 64 per cent were sterile. Gauss[38] noted that after cesarean section 58 per cent of the women became pregnant the second time, 15 per cent the third time, and only 3 per cent the fourth time, so that a single marriage in women upon whom cesarean sections are done produces only 1.8 children, whereas to maintain the population 3.46 children would be required.

It has already been pointed out that a considerable number of total maternal deaths follow cesarean section, 10.7 per cent in the Children's Bureau statistics,[7] and 15.7 per cent in Calvert's Wisconsin tabulation.[8] For 1929, 136 hospitals[20] reported on the total number of maternal deaths and on the deaths among patients delivered by cesarean section. The maternal deaths totaled 685, of which 133 (19.4 per cent) had been subjected to cesarean section.

From the Conference questionnaire[20] relating to figures for 1929, it is found that 138 hospitals recorded 2,273 cesarean sections with 134 maternal deaths, 5.9 per cent.

Mortality figures for cesarean sections in large sections of the population are afforded by the few extensive compilations already mentioned. (Table XIX.)

TABLE XIX. MATERNAL MORTALITY FOLLOWING CESAREAN SECTION. HOSPITALS IN THE UNITED STATES

AUTHOR	LOCATION	CESAREAN SECTION MORTALITY PER CENT
Welz[40]	Detroit	13.0
Miller[41]	Hartford	4.5
Smith[48]	Indianapolis	11.3
Tiber[49]	Minneapolis-St. Paul	5.7
Thompson[45]	Los Angeles	4.2
DeNormandie[43]	Massachusetts	8.8
Gordon[59]	Brooklyn	7.1
Gynec. and Obst. Soc.[42]	New Orleans	16.1
Davis[63]	Houston	14.4

Greenhill[50] records 1,059 cesarean sections at the Chicago Lying-In Hospital with a total maternal mortality of 1.7 per cent, and Williams[64] reports 349 cases at the Johns Hopkins Hospital with a gross mortality of 12, 3.4 per cent, for the best results reported in this country for comparable series.

The results of large series of operations abroad correspond closely to those reported from the United States. Holland[62] analyzed 4,197 cesarean sections done in Great Britain and Ireland during the years 1911 to 1920, and found a gross maternal mortality of 7.2 per cent, while Winter's collected German statistics for 1928[51] showed 4,450 operations with a mortality of 7.1 per cent.

When all such figures are examined, it becomes clear that the average death rate following cesarean section is between 5 and 10 per cent, probably nearer the latter figure. Various factors help to determine the mortality, especially (1) the time of performance of the operation, (2) the indication for the intervention, and (3) the type of operation, and the operator.

Holland's classical report[62] emphasized the relation between the time of operation and the maternal risk, and all subsequent observations have confirmed his findings, which stress the fact, too little appreciated, that elective section done before the onset of labor carries a low mortality, while emergency operations are extremely dangerous. Among 1,953 abdominal cesarean sections for contracted pelvis, the following death rates prevailed (Table XX).

TABLE XX. MATERNAL MORTALITY FOLLOWING CESAREAN SECTION FOR CONTRACTED PELVIS. (HOLLAND)

TIME OF OPERATION	NO. OF OPERATIONS	MATERNAL DEATHS	
		NO.	PER CENT
Not in labor	1,202	19	1.6
Early in labor	389	7	1.8
Late in labor	220	22	10.0
After induction of labor	35	5	14.3
After attempts at vaginal delivery	107	29	27.1

TABLE XXI

INDICATION	HOLLAND[62]		GORDON[59]	
	NO. OF CESAREAN SECTIONS	PER CENT DEATHS	NO. OF CESAREAN SECTIONS	PER CENT DEATHS
Contracted pelvis	3,372	4.1	934	5.8
Eclampsia and other toxemias	231	30.3	210	16.2
Antepartum hemorrhage	208	16.8	117	6.0
Other conditions	386	12.4	544	6.3

TABLE XXII. INDICATIONS FOR CESAREAN SECTIONS (GREENHILL)

INDICATION	PER CENT MATERNAL MORTALITY
Disproportion	0.8
Repeated cesarean section	1.6
Toxemia without convulsions	1.2
Eclampsia	6.3
Placenta previa	0.0
Abruptio placentae	7.1
Cardiac disease	3.4
Inertia	0.0

Holland,[62] Greenhill,[50] and Gordon[59] furnish evidence concerning the relation between the indication for the operation and the mortality rate.

Greenhill's excellent report[50] shows a similar difference with a lower gross mortality.   (Table XXII.)

Operations done for strict maternal indications appear to have a lower death rate than those for fetal indications (eclampsia, antepartum bleeding, etc.).   Since the operation has been extended in scope largely along the latter lines, the wisdom of such extension may be doubted.

The low cesarean section (two-flap, cervical, etc.) has been advanced as safer than the older classical operation, and in certain hands seems to have justified this opinion, although the figures which have been collected leave the question in doubt.   (Table XXIII.)

TABLE XXIII.   COMPARATIVE MORTALITY OF THE CLASSICAL AND CERVICAL SECTION

	CLASSICAL CESAREAN SECTION			CERVICAL CESAREAN SECTION		
	NO. OF OPERATIONS	DEATHS		NO. OF OPERATIONS	DEATHS	
		NO.	PER CENT		NO.	PER CENT
Thompson[45]	1,060	43	4.1	262	13	4.9
Greenhill[50]	147	7	4.8	874	11	1.3
Quigley[61]	104	2	1.9	61		
Ronsheim and					0	0.0
Daichman[46]	529	16	3.0	36	2	5.5
King[60]	34	3	8.8	36	4	11.1
Winter[51]	438	28	6.4	3,354	124	3.7
Jaschke[25]	32	5	15.6	221	13	5.8
Williams[64]	255	4	1.6	56	1	1.8

Davis[63] in reporting the cesarean sections in Houston for the years 1923 to 1926 brought out the fact that in that period there had been 51 operations done by general surgeons and general practitioners with a death rate of 33 per cent, while 56 operations were performed by obstetricians alone or in association with general surgeons with a mortality of only 1.8 per cent.   Such figures emphasize the need for judgment rather than the demand for operative skill.

The radical cesarean, or cesarean hysterectomy, as recommended for use in emergency cases, especially in the presence of infection, has a considerably lower mortality than either the classical or cervical conservative operation done under similar circumstances.   Williams[64] reports 126 such operations with 10 deaths (8.0 per cent), while Greenhill[50] records 38 without a death.

INFANT MORTALITY FOLLOWING CESAREAN SECTION

The chief argument advanced for the wider use of cesarean section is that it conserves infant life, and theoretically this is true, since, with but few exceptions, a dead fetus should contraindicate the operation.   General statistics, however, fail to show a saving of infant life, although certain institutions are able to record a low fetal mortality. (Table XXIV.)

TABLE XXIV.   CESAREAN SECTION INFANT MORTALITY (UNITED STATES)

AUTHOR	PLACE	PER CENT STILLBIRTHS AND NEONATAL DEATHS
Welz[40]	Detroit	11.0
Miller[41]	Hartford	15.3
Smith[48]	Indianapolis	8.7
Tiber[49]	Minneapolis-St. Paul	14.3
Gynec. and Obst. Soc.[42]	New Orleans	18.9
Gordon[59]	Brooklyn	8.7
Thompson[45]	Los Angeles	7.9
Carroll[37]	Toledo	11.1
King[60]	New Orleans	11.4

Figures from the Iowa questionnaire[23] show a 10 per cent infant death rate in 162 cesarean sections, while data from the Iowa birth certificates[22] reveal 8.4 per cent of stillborn children in 139 cesarean sections, with no figures on neonatal deaths.

The Conference questionnaire[20] revealed 120 hospitals reporting on the infant deaths among women delivered by cesarean section, with 1,938 operations and 168 infant deaths, 8.7 per cent.

By contrast, Greenhill[50] reports a total infant death rate of 4.5 per cent in 874 sections, Quigley[61] 4.2 per cent in 165 operations, and Duncan[30] 2.8 per cent in 178 cases.

Winter's[51] collected 1928 German statistics show a total infant mortality of 403 in 4,450 operations (9.0 per cent), with almost one-half (175) of the children certainly dead when the operation was undertaken.   Other comparable foreign figures include (see Table XXV).

TABLE XXV.   CESAREAN SECTION INFANT MORTALITY (FOREIGN)

AUTHOR	INFANT DEATH RATE AFTER CESAREAN SECTION PER CENT
Jaschke[25]	9.5
Pritzi[17]	10.2
Lehoczky-Semmelweiss[52]	9.4
Martin and Spieckhoff[32]	3.7

Such figures, taken as a whole, largely destroy the argument that cesarean section, as it is commonly employed, is a life-saving procedure for the child.   Undoubtedly, this failure is due to lack of appreciation of proper indications for the operation, and of the possibilities of vaginal delivery.   The desire to "do something" in the face of obstetric complications leads to many errors of judgment.   It is largely among the "fetal" indications for the operation that the infant deaths occur.

The fetal mortality obviously depends upon the indication for which the section is done.   Greenhill,[50] Holland,[62] and Gordon[59] report comparable figures, see Table XXVI.

TABLE XXVI. FETAL MORTALITY DEPENDING UPON INDICATION

(GREENHILL)[50]	
INDICATION FOR OPERATION	INFANT MORTALITY PER CENT
Disproportion	3.3
Eclampsia	0.0
Placenta previa	23.8
Abruptio placentae	35.7

INDICATION	HOLLAND[62] INFANT MORTALITY PER CENT	GORDON[59] INFANT MORTALITY PER CENT
Contracted pelvis	8.1	1.9
Eclampsia and other toxemias	46.9	21.9
Antepartum hemorrhage	47.8	25.6
Other indications	21.8	8.4

DISCUSSION

The marked increase in forceps deliveries in this country is accounted for largely by the performance of "convenience" operations. Although they have been dignified by the name "prophylactic forceps" there is no good evidence that they prevent anything but loss of time on the part of the operator. To quote Eden,[65] "I doubt very much whether this is a prophylactic procedure. . . . ." It is admitted that, in expert hands and amid proper hospital surroundings, the risk attached to the "convenience" low forceps is only slightly increased for the mother or child, but the practice has spread rapidly to those who do not have the proper training or adequate facilities, to the detriment of our general infant and maternal mortality records, thus substantiating the fears expressed in 1920 by Eden:[65] "We ought to make the conduct of normal labor as simple a matter as possible, because it will be from the standpoint of the country at large in the hands of comparatively unskilled men, and the harm which may be done by meddlesome midwifery, although the operation is designed to correct it, may in a few years become widespread."

Frequent reiteration of the necessity for aseptic technic and for adequate facilities and assistance does little to discourage general practitioners from following the spoken and written words of authorities who do almost routine operative deliveries. What is needed is a return to the idea that parturition is essentially a physiologic phenomenon, which should be interfered with only for good reason. The public should be educated to the fact that frequently a spontaneous delivery calls for more knowledge, skill, and judgment than does operative intervention, and that such services should be remunerated accordingly. Radicalism has so permeated the rank and file of physicians that appeals to them, even on the basis of established fact, can hope to accomplish results too slowly. There is perhaps some little evidence of a reaction toward conservatism but it will take years for

the pendulum to swing to a middle position where recent advances in operative technic can demonstrate their complete usefulness.

Organizations attempting to establish fee scales for medical services should be made to recognize the ridiculousness of certain provisions which have been popularized. The establishment of a higher fee for dilatation and curettage than for a spontaneous delivery is a case in point. And official sanction for a fee for forceps or version twice as high as for normal labor surely leads to temptation. There are certain advantages to a standard fee for delivery, irrespective of the need for operative intervention, although such an arrangement would be decidedly unpopular with the profession.

The increased use of cesarean section is merely part of the modern operative furor, but from the standpoint of maternal mortality probably the most important, since by conservative estimate the death rate is between 5 and 10 per cent. Assuming the actual incidence of the operation to be 1 per cent in the country as a whole, and the total number of deliveries in the United States to be 2,500,000, 25,000 cesarean sections would be done in the space of one year. If Tiber's[49] incidence of 0.26 per cent represents the limit of conservatism, then three-fourths of the usual number of operations are more or less unnecessary, entailing a death list of from 900 to 1,800 per year. Two and one-half million births with a total mortality of 70 per 10,000 represent 17,500 deaths from puerperal causes, one-third of which occur before the period of viability, leaving 11,700 as the probable toll taken by delivery as opposed to early miscarriage. The saving that might be expected from a diminished cesarean section incidence would represent at least 10 per cent of this loss, and would result in bringing our national maternal death rate down more nearly to that of other countries where vaginal delivery is more common and where the physiologic character of labor is better appreciated.

There is little hope that this national operative furor will wear itself out quickly, but it may be that wide dissemination of the general principles underlying the relatively safe performance of obstetric operations can effect some improvement. The danger of routine forceps can be minimized by careful attention to asepsis, while as regards cesarean section emphasis must be placed upon the early performance of the operation as an elective procedure. It should, moreover, be stressed that abdominal delivery has little place in the treatment of eclampsia, and that conservative medical care has actually established itself as the treatment of choice.

But for permanent and lasting relief, a return to first principles is necessary, it should be taught that any interference with normal labor carries a definite risk. This educational program should be carried to the medical profession at large, but especially to the laity, who after all largely determine the character of medical practice.

For my closing paragraph let me go back almost a century to Joseph Warrington's *Obstetric Catechism*, published in 1842, where the question is asked,

"What influence is the practitioner to exert in normal labor?" and the answer given,

"A negative influence, rather to prevent mischief than by being himself very active."

And to Elizabeth Nihill's *A Treatise on the Art of Midwifery*, published in London, 1760, from which is taken the following quotation:

"In this, they are some of them but too near upon a level with the man-midwife, with this difference, however, in favour of the female practitioners, that they are incapable of doing so much mischief as the male ones, oftenest more ignorant than themselves, but who with less tenderness and more rashness go to work with their instruments."

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SPERM MORPHOLOGY IN RELATION TO FERTILITY*

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INTRODUCTION

IT IS rather unfortunate that the huge and many sided problem of fertility has so often been attacked only from its most abnormal aspect, namely sterility. Diminished fertility of insufficient degree to prevent the possibility of begetting offspring has received scant attention, and thus sterility has not infrequently been set up as an abnormality, separate and apart, and opposed to fertility. As a matter of fact, actual sterility, that is, the utter inability of having issue, is generally a rather simple condition, associated with more or less gross defects. What is so commonly described as sterility, on the other hand, is often only lowered fertility. The latter is naturally a graded abnormality which with normal fertility as its starting point progresses steadily downward until finally such a low plane of fecundity is reached that clinical sterility is present.

In the female the disturbances of fertility have been fairly well studied, whereas often the only requirement the man had to meet was that of producing motile sperms.

For years I have felt that the examinations made to determine male fertility were entirely inadequate, and that the presence of motile sperms did not constitute a satisfactory proof of the fertility of the husband. It always seemed to me that the morphology of the sperms should also be considered. The present work represents the results of such a morphologic study.

GENERAL CONSIDERATIONS

In some earlier, preliminary articles[1, 2, 3, 4] I considered some of the aspects of obscure cases of lowered or absent fertility and called attention to the apparent relation of sperm-head morphology and biometrics to fertility. The present article is a continuation and seemingly a confirmation of the previous work. Up to date, at least, I have no reason to change any of the views expressed in previous writings on the subject, although many points now call for amplification.

In attempting to determine male fertility one is faced with the identical but reverse problem which confronts one in attempting to determine the ability of the female to bear offspring. For the same reasons that an infertile union requires not only a thorough examination of the wife, but also of the husband, we had to examine as carefully and fully as possible the woman as well as the man, even though our main object was to attempt to gain knowledge regarding male fertility.

The present work is based on a study of 141 couples from the clinic and private practice varying in age in the woman from eighteen to forty-one, and in the man from twenty-two to forty-eight years of age. Of the total number, 37 cases were considered normal, 63 were sterile, and 41 intermediate. The average age in these three groups did not differ significantly. The so-called intermediate group comprises those cases in which the wife conceived only with difficulty or failed to conceive again, despite her wish for more children, or where spontaneous abortions or premature or abnormal children were a dominating feature. This group also includes some cases which are doubtful because the obtained data were not reliable, or because the fertility of both partners was impaired.

The 37 normal couples together had 94 children, no stillbirths, no premature labors, 5 accidental or traumatic abortions, 25 induced abortions, and 4 spontaneous abortions. Two of the latter still may have been induced as the women made conflicting statements at different times. The third and fourth abortions were apparently genuinely spontaneous, but since the woman in one case had had eight other normal pregnancies, and in the other case 13 more normal pregnancies, we felt that the occurrence of one spontaneous abortion did not prevent these two women from being considered normal. The small number of spontaneous abortions is of course accounted for by the fact that with the exceptions just mentioned we did not put the woman into the normal group if she had had spontaneous abortions.

The 41 intermediate cases had 33 normal children, 2 abnormal children, 7 stillbirths at term, 5 prematurely born stillbirths, 11 induced abortions, 4 traumatic abortions, and 49 spontaneous abortions.

In Table I we see that in 41 cases which were not sterile, but whose fertility was impaired in some way, the woman was otherwise normal as far as we could determine 26 times, had a severe endocervicitis 4

times, and adnexal disease 7 times. Of the latter cases, 5 were insufflated and found to have closed tubes, and two were not subjected to this procedure because their adnexal lesions were too acute. Two other women out of these 41 had an uncomplicated retroversion which we do not consider a sufficient explanation for sterility.

Four patients had a small uterus. In only one of these, however, could the uterus be considered so highly hypoplastic as to have any bearing on the lowered fertility. Three women had an endocrine dysfunction as indicated by irregular and scanty menstruation, obesity, and in one case increased growth of body hair. Some of the women in this group had more than one abnormality, so that the total number of defects in the above cited cases will add up to more than the actual number of patients.

Of the 63 sterile unions, the women were normal 24 times, had cervicitis four times, adnexal disease with closed tubes 14 times, a markedly underdeveloped uterus 8 times, an uncomplicated retroversion twice, an endocrine dysfunction 9 times, and were generally below par physically in two instances.

Naturally there were among all these patients actually more cases of cervicitis and small uterus than are tabulated here, but we included here only those lesions which might play a rôle in impairing the fertility. Furthermore, I preferred to be over-particular in placing the onus of an otherwise obscure case of sterility on the female rather than to explain such infertility by a slight abnormality of the woman just because it would fit well into our statistical results.

In the case of the men, 16 (of the 41 unions showing impaired fertility) were normal according to our standards, which will be given in detail later on. Twelve were definitely abnormal, and 13 were borderline cases.

In the 63 sterile matings the men were normal 21 times, abnormal 37 times, and borderline or doubtful cases 5 times. Ten of the 63 men had no spermatozoa at all, and all of these cases gave a history of gonorrheal infection with bilateral epididymitis.

Tables I and II show the various figures, given so far, more clearly.

Of the 104 cases of impaired or lost fertility, the women thus were normal in 49 cases, and the men in 37. In 9 instances both partners showed at least impaired fertility. On the other hand, in 8 of these 104 marriages nothing could be found wrong with either partner. In four of these cases, however, only the man could be examined, but the wife was said to be normal. The various figures as given here have perhaps some interest in connection with the work of other authors.[5-16] They must, however, not be given too much value, since first of all our series is very small, and in addition the cases are not quite random samples, but in some instances hand-picked to suit our particular purpose.

TABLE I. PHYSICAL FINDINGS IN THE WOMEN

	TOTAL NUMBER OF CASES	NORMAL	ENDO-CERVICITIS	ADNEXAL DISEASE	RETROFLEXION OF UTERUS	SMALL UTERUS	ENDOCRINE DISTURBANCE	PHYSICALLY BELOW PAR
Cases of impaired fertility	41	25	4	7	2	4	3	1
Cases of sterility	63	24	4	14	2	8	9	2

TABLE II. RESULTS OF THE SEMEN EXAMINATION IN THE MEN

	TOTAL NUMBER OF CASES	NORMAL	FAIR	POOR	NO SPERMA AT ALL
Cases of impaired fertility	41	16	13	12	—
Cases of sterility	63	21	5	27	10

In Table I the figures in the various columns added together total more than the numbers in the first column since some of the women had more than one lesion.

THE EXAMINATION OF THE WOMAN AND THE MAN

In order not to be subjectively influenced we examined the husband's semen first, and after this examination had been completed, an examination of the patients was carried out along the lines already laid down in previous articles.[4]

MORPHOLOGY OF THE SPERMATOZOA

In examining the semen and its morphology, a complete examination of the semen, both grossly and microscopically, was of course made (see Moench and Holt,[4b] and Moench[4m]). The morphology of the spermatozoa has been gone into by various observers (Ballowitz,[17] Cary,[18] Huhner,[11] Gilman,[19] etc.), but almost invariably the conclusions drawn from a morphologic study of this kind are as Huhner expressed it "that if a sufficient number of normal actively motile sperms are present in a semen specimen, the presence of the abnormal sperm cells does not interfere with its potency." *To this we cannot subscribe. On the contrary, we found that the sperm head is the greatest single source of information as to the fitness of these cells for reproduction, and that, in average cases, the relative number of abnormal sperm heads affords an index to the reproductive fitness of the individual. This must mean that a disturbance of spermatogenesis is present which affects all the sperm cells, but that only the more grossly deformed ones are visible, because our microscope is too crude an instrument to detect slighter changes.*

After satisfactory smears had been obtained and stained, normal and abnormal sperm forms were counted and tabulated under precautions already described (Moench[4m]). Fig. 1 illustrates some of the abnormal forms seen by us.

It is practically self-evident that a simple, more or less mechanical, tabulation of the various sperm abnormalities will not directly answer the question of how good or bad any given sample of semen was. The various abnormalities have not all the same importance. The final evaluation of any semen from the standpoint of morphology can therefore only be made by taking all the vital points into consideration. It thus became extremely important to recognize the weight and value of the various abnormal forms encountered.

Head Changes.—Abnormalities of the sperm head are by far the most important changes, much more so than the body changes or any other aberrant forms, or even the total number of abnormal spermatozoa present. This is brought out clearly by Tables III and IV. Table III shows the head changes consistently low (below 200 per thousand) in the normal group and those sterile cases where the woman was definitely abnormal, and high (above 250 per thousand), in that group where the woman was normal. The total number of abnormal sperms

TABLE III. TABULATION OF SPERM CELL CHANGES PER 1000 OBSERVED IN 36
RANDOM CASES, 12 OF WHICH HAD A NORMAL AND 24 AN ABNORMAL
BREEDING RECORD. IN 12 OF THE LATTER 24 CASES THE
WOMAN WAS NORMAL AND IN 12 DEFINITELY
ABNORMAL

	CASE NUMBER	TOTAL CHANGES	HEAD CHANGES	TOTAL CHANGES MINUS HEAD CHANGES	TOTAL BODY CHANGES
Clinically Normal Cases					
1	92	361	193	168	101
2	81	304	111	193	104
3	40	233	170	63	62
4	58	150	94	56	32
5	17	302	151	151	147
6	18	424	133	291	102
7	28	270	154	116	21
8	71	362	136	226	124
9	102	176	125	51	37
10	59	339	122	217	83
11	128	372	182	190	106
12	37	194	123	71	45
Sterile Cases—Woman Abnormal					
1	38	203	151	52	42
2	110	343	124	219	72
3	101	282	125	157	29
4	124	321	193	128	60
5	36	274	162	112	95
6	13	296	171	125	100
7	129	221	113	108	55
8	69	272	134	138	78
9	25	403	102	301	140
10	127	334	141	193	49
11	100	223	133	90	53
12	114	291	124	167	60
Sterile Cases—Woman Normal					
1	7	352	271	81	90
2	61	443	294	149	78
3	11	292	262	30	43
4	140	581	343	238	106
5	32	514	261	253	90
6	23	511	364	147	84
7	139	653	291	362	157
8	39	372	273	99	60
9	126	516	274	242	134
10	73	464	242	222	82
11	78	360	244	116	86
12	63	481	322	159	83

observed however shows no relation to the clinical fertility record, except as it is increased by the higher abnormal head count. The body changes also cannot be correlated with the clinical fertility (Table IV).

We did not deem it necessary to reproduce here a tabulation of this sort for all our cases, since they all ran about the same, and these 36 cases may serve as examples.

That body changes are not very important does not agree with the opinion originally held by Williams and Savage,[20-29] since these investigators believed that body changes are even more important than

TABLE IV. BODY AND OTHER CELL CHANGES PER 1000 (EXCEPT HEAD CHANGES) IN SAME CASES AS TABLE III

	BODY CHANGES				OTHER ABNORMALITIES			
CASE NO.	TOTAL BODY CHANGES	CYTOPLASMIC EXTRUSIONS	NAKED BODY FIBRILS	THICKEDED BODIES	COILED TALES	UNDEVELOPED CELLS	DOUBLE FORMS	MISCELLANEOUS
Clinically Normal Cases								
1	92	101	18	33	50	28	3	33
2	81	104	27	7	70	30	13	37
3	40	62	4	9	49	16	4	14
4	58	32	6	2	24	14	6	6
5	17	147	0	37	110	53	20	3
6	18	102	15	0	87	175	25	0
7	28	21	2	17	2	30	38	32
8	71	124	16	36	72	54	16	72
9	102	37	17	3	17	20	0	10
10	59	83	7	23	53	107	10	10
11	128	106	2	20	84	66	0	18
12	37	45	8	6	31	51	6	3
Sterile Cases—Woman Abnormal								
1	38	42	4	14	24	4	2	2
2	110	72	12	10	50	130	15	7
3	101	29	2	9	18	118	12	4
4	124	60	7	12	41	31	17	17
5	36	95	16	6	73	11	5	5
6	13	100	24	8	68	16	8	4
7	129	55	5	8	42	35	5	15
8	69	78	5	18	55	33	13	15
9	25	140	10	77	53	90	40	7	Thickened end ring 1 in 300
10	127	49	8	8	33	100	15	30
11	100	53	10	3	40	23	20	10
12	114	60	12	24	24	88	16	10
Sterile Cases—Woman Normal								
1	7	90	0	7	83	10	10	0
2	61	78	16	10	52	38	14	6	Thickened end ring 5 in 500
3	11	43	20	3	20	0	0	10
4	140	106	33	0	73	33	20	80
5	32	90	0	50	40	112	42	4	Thickened end ring 1 in 500 Abaxial 3 in 250
6	23	84	8	24	52	28	56	24
7	139	157	17	40	100	143	37	27
8	39	60	0	7	53	17	3	17	Abaxial 1 in 300 Thickened end ring 2 in 700
9	126	134	19	36	79	46	21	34
10	73	82	10	22	50	78	45	18
11	78	86	13	16	57	11	2	23
12	63	83	8	18	57	53	12	15

head changes. This disagreement is, however, easily explained. In the bull, body changes are uncommon. As a result, they are observed principally only in really bad samples of semen and for this reason naturally seemed to have great significance. On the other hand, in
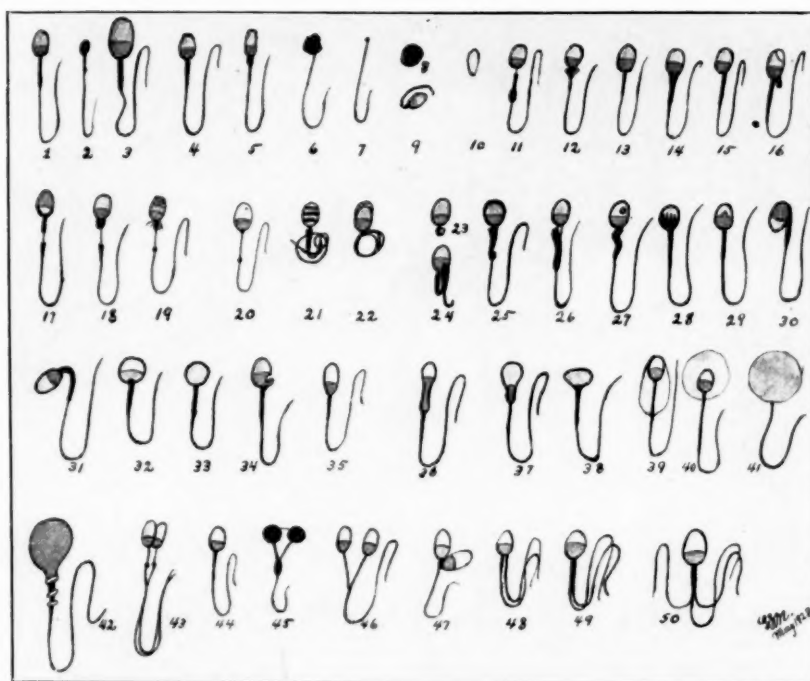
Fig. 1.—*1*, Normal spermatozoon. *2*, Microsperm. *3*, Megalosperm. End fibril of tail well pronounced in this specimen. *4*, Roughened head membrane. *5*, Narrow cell with spheroidal swelling of body. *6*, Irregularly solid staining head and absence of body. *7*, Aplastic head and absence of body. Such cells have been seen motile. *8*, Arrested development of germ cell—tail tightly coiled about head; head solid staining. *9*, Arrested development of tail. *10*, Phantom cell, takes almost no stain; head tapers posteriorly, due to lack of division of end knobs; no body or tail. *11*, Filiform middle piece and spheroidal swelling of posterior end of body. *12*, Cytoplasmic extrusion; pseudo-swelling of head. *13*, Overdevelopment of end knobs; posterior end of head square. *14*, Body tapers, broader anteriorly—form of cytoplasmic extrusion. Of no clinical significance. *15*, Abaxial implantation of body and tail. *16*, Abaxial implantation of body and tail. Cell originally double bodied and stump of second body still present. Oblique tear or separation of head membrane. *17*, Separation of body (probably artefact). Reverse staining of head, anterior portion darkest. The thick line running along the base of the head is found at times. Whether it represents an overdeveloped end knob or a remnant of the blepharoblast (cf. Bowen [154]) or cytoplasm is somewhat in doubt but from our microdissection studies we tend to the last possibility. *18*, Separation of body; perhaps the thickening in the anterior portion is due to a drawing up of the body by the elastic fibers present here, or the anterior or posterior end knob or both end knobs may be overdeveloped. *19*, Short fibrils seen around abnormal body. Elastic fibrils? Thickened end ring. The cell head also shows fine stippling which is occasionally met with. It apparently indicates a beginning degeneration of the head covering. See also *21*, *28*, and *29*. *20*, Thickened end knob and end ring. Naked body fibril. *21*, Coiled tail which is of no significance and undoubtedly an artefact. In addition we have here cross lines on the head which are not to be confused with Valentine's cross bands and represent either artefacts or degeneration. This cell also shows a narrowed neck which probably does not represent a separation of the anterior or posterior end knobs, as I have seen this picture especially in slides not made by myself and more or less roughly handled. *22*, Cell with coiled tail, may be an artefact or may be an actual change in the cell. At any rate, it is a late change and of relatively little significance. Such cells have been seen motile, although their motility is of necessity limited. In addition this cell head shows an apparent head cap but whether this is really a head cap such as is found in the case of the guinea pig or a separation of the head membrane is still under investigation. *23*, Coiled undeveloped tail. This is important as the cell has nothing to propel it. *24*, Tail folded up, artefact. *25*, This cell shows a nick in the body and a little piece similar in size and shape, but upside down, attached to the opposite side of the body. It would seem as if this body had been tightly coiled and in straightening out had torn a piece out of the body. Williams and Savage[179] have seen some specimens of semen from the bull in which a fair number of the cells showed such a nick in the body with a small piece similar in size and shape to the nick, attached to the tail of the cell. Cell 25 also shows the thickening of the anterior head membrane seen in some cells. *26*, This probably represents a splitting loose of the sheath of the body. *27*, Crooked thickened body. In the head a little refracting area whose significance is unknown. Polar body? Centrosome? Plasmosome? Artefact? *28*, Several dark areas at the demarcation of the light and dark areas of the head. Rents in the head capsule? *29*, Apparently a splitting of the capsule. *30* and *31*, These forms are not artefacts. They have been seen motile in the fresh specimen, and do not straighten

man body changes are quite common, being frequent even in good semen as shown by our tables. On the basis of our investigations of the sperm body changes in man, Williams and Savage have gone over their cases again and now agree with us that body changes, alone, unless present in really large numbers, are less significant than head changes.

All head changes (see Fig. 1) are, however, as can be readily appreciated, also not of equal importance. A slight narrowing of the head, for instance, unless present in most of the cells, usually is of relatively little significance. Somewhat rounded heads are also to be considered normal. Really round heads were counted by us as abnormal, but whether or not they are important is still undetermined, because they never are present in large enough numbers to allow of their proper evaluation.

Distinctly large round cells are probably more or less immature or degenerated cells and distinctly of importance, but are also never seen in sufficiently large numbers to allow of statistical correlation with any clinical abnormalities. As a matter of fact, generally large cells seem not infrequently to have a definite tendency to a double form, and Lespinasse[30] has seen such cell forms and double forms as the result of the exposure of the gonads to radiant energy (see also Painter[31]).

Distinctly narrow cells, and rounded cells tapering at the base are extremely important and in themselves represent probably the most sinister morphologic change of the sperm head, as far as fertilizing power is concerned. In such narrowed and tapering cells the nuclear material of the head is necessarily reduced, thus probably impairing the value of the cell. Aside from this, however, the base of the head where the chromosomes of the spermatozoon are situated, becomes involved.

out. They often move sideways, backwards, or in circles (see text). 32, Rounded cell head with overdeveloped anterior end knob. Moderately rounded heads are probably normal variations and of no clinical significance unless they show other abnormalities as in cell 33, where staining reaction is abnormal and the cell therefore probably inferior. 34, Cell head with apparently a piece of the cell membrane of the base broken out. Due to trauma? 35, Frequently seen form of tapering head. Significant when present in large numbers in any one sample of semen. 36, Exaggerated narrow and tapering cell with spheroidal swelling around base; overdeveloped end knobs? This form of head must be separated from spheroidal swellings of the cell body in this region. 37, Tapering cell, nuclear material diminished. These cells easily separate from the body. 38, Extreme form of tapering cell. 39, Immature cell, cytoplasm of cell not cast off; no body. Nucleus (sperm head) has moved to anterior portion of cell. Such cells are occasionally seen, as also cell 40, which likewise represents an immature cell which has failed to cast off its cytoplasm, the nucleus (head) not even having moved to the anterior portion of the cell. 41, Puff ball type of cell, contour washed out; short tail; no body. This form of cell, representing an immature abnormally developed cell, has been seen in the fresh specimen, but often is an artefact and produced by allowing the cells to dry slowly in a moist heat. Rapid drying in the flame will prevent such puffing or disintegration of the cells. 42, Large immature cell-spiral fibers about the body, or cytoplasmic discs? 43, Double form showing in each cell the same abnormalities, namely a narrow head, naked body fibril, and thickened end ring. Double forms are at times only apparent or artefacts, but in other cases double forms are actually present, especially the megalosperms showing a tendency to double bodies and tails. Even two separate sperms stuck together must have a significance since they frequently, as in this case, show the same abnormalities, indicating disturbed spermatogenesis and lack of complete separation (see also text). 44, Double neck. 45, Double sperm, immature, spermatic veil over and between heads, swelling of body. 46, Double head and body. 47, Double heads, one almost without body. 48, Single head, double body and tail. 49, Single head, single thickened body, double tail. 50, Single head, single thickened body, triple tail.

As far as the size of the sperm heads is concerned, we can say that all cells from one ejaculate should be more or less of the same size. Reasonable differences, however, must be allowed for, and only definitely marked variations in size which usually concern the longitudinal axis of the head should be counted as abnormal.

Some of the other abnormalities of the head which were found are shown in Fig. 1 and explained by the legend, so that further detailed discussion of these cells is unnecessary here.

Abnormalities of the Sperm Bodies.—The body, or middle, or connecting piece of the spermatozoon undergoes often, in man at least, slight or pronounced changes. In rare instances the body is missing entirely.

Sometimes the body is partially absent, so that instead of the normal, fairly thick middle piece we get only a thread-like structure which connects the head to the tail. (Fig. 1, cells 11, 17, 18, 19, 20, and 43.)

Swelling of the middle piece, instead of thinning, as seen in the condition just described, is extremely common in the human spermatozoon. There are, however, three different conditions to be distinguished here, see Fig. 1, cells 36, 5, 11, 32, and 12, and legends. See here Savage,[28, 29] W. L. Williams,[32] Piersol,[33] and Bailey and Miller.[34]

Thickened and Double Bodies.—Thickened and double bodies are also present in the human semen. A number of cells in Fig. 1 show thickened bodies. Various forms of doubling occur, and may be more or less complete, due to incomplete division during the course of spermatogenesis. The double cell forms are rarely frequent, seldom constituting more than 1 or 2 per cent of the total number of sperm cells present. It is interesting in this connection that in Case 95 where the breeding record was decidedly bad, and fetal malformations repeatedly occurred, the man had almost 12 per cent double forms.

A fairly common abnormality was a bending or curving of the body on its longitudinal axis. This has been described at times as a sign of gradual dying of the cell, but we have seen it also in motile sperms in perfectly fresh specimens (cells 30 and 31, and legend to these figures).

Tails.—At times the whole tail is absent and only a free head seen. This may be an artefact, but in other cases must have significance, since free heads, but no free tails, are seen in fresh specimens. Especially tapering heads seem to be easily afflicted with a loss of the tail which, by the way, is always associated with the loss of the body, as the tails do not break off except due to excessive trauma at the posterior end of the body.

Coiled Bodies and Tails.—Fig. 1 and the legend describe this subject sufficiently. (See here Moench[4j] and Chambers.[35, 36, 37])

It might be thought, perhaps, that some of the cell forms observed represent artefacts or at least variable factors. That this is not so has been shown in previous articles (Moench[3, 4b, 4d, 4h, 4i, 4j, 4k, 4l, 4m]).

Under ordinary conditions the morphology of any semen sample remains remarkably constant, specimen after specimen, even with varying frequency of intercourse, showing exactly the same results in the tabulation of the cytology. In fact, unless the patient from whom the semen was obtained was afflicted by an intervening sickness or other change in physical health, the semen specimen could be said almost to have that particular patient's trademark on it. In one instance, one of us, knowing nothing about the case, except that it was a reexamination, identified the man from whom the semen was obtained

Moist heat, however, does affect the cells and causes a marked disturbance of the sperm heads, immediately recognizable. The cells become puffed, huge in size and foggy in outline, and often appear granular. This occurs especially in hot summer weather, and only while the cells are drying on the slide. By fixing the slide in the flame immediately while still moist the puffing of the cells can be prevented. Alcohol fixation also prevents its occurrence.

Since our various tests and microdissection studies showed us that the morphology of the sperm cells was constant, we felt that the sperm abnormalities observed under the microscope were really significant, and we therefore believed ourselves justified in making comparative studies of such variations in appearance of the individual spermatozoa.

We tabulated our results in a series of tables (not reproduced here), and found that the semen examinations in 37 marriages in which the breeding record was normal as far as we could determine averaged 142 abnormal heads per 1000, and were always below 200 per thousand. It was also found that no normal semen contained the especially sinister, tapering or narrow, sperm heads in a greater number than 76 per thousand. We considered the case normal if the wife had conceived quickly under natural conditions, had been normally pregnant recently, and had had no stillbirths, premature labors, or spontaneous abortions, with the two exceptions previously mentioned.

In 11 cases where the woman was clinically abnormal, and the couple not sterile, but of definitely impaired fertility, the sperm head changes averaged 158 per 1000. In one case here we had 221 abnormal sperm heads per 1000, but since we arranged all our cases only from the side of the woman, it is of course self-evident that an abnormal woman may be married to a sterile man.

In 29 cases where the woman was clinically abnormal and the couple sterile, the head changes averaged 165 per 1000 (the gradually increasing number of abnormal heads of course being explainable by the method of arranging our tables from the female side only, as mentioned. Naturally such an arrangement will produce some discrepancies, but we felt that the method employed would be the safest and perhaps least subject to personal factors).

On the other hand, in 30 cases where the woman was clinically normal and the couple was not sterile but had a poor breeding record, the head changes averaged 237 per 1000, and in 34 cases where the woman was also normal but the couple sterile, the head changes went up to 287 per 1000.

The total number of abnormal cells and the body changes or other cell variations never gave such decisive figures as the apparently all important sperm head abnormalities.

If then from our small series of cases we may be permitted to draw conclusions we would say:

1. In a normal semen the abnormal sperm heads do not exceed 19 to 20 per cent.

2. When the sperm head abnormalities reach 20 to 23 per cent, impaired fertility can be assumed.

3. When the sperm head abnormalities are above 25 per cent, clinical sterility is usually present.

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30 EAST FIFTY-EIGHTH STREET.

URINARY TRACT INFECTIONS DURING PREGNANCY*

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URINARY tract infections during and after pregnancy, have received a great deal of attention in the past few years. Many papers have appeared especially as the result of urologic investigation, until at the present time the field is very well covered from the standpoint of etiology, diagnosis, and treatment of urinary tract infection in the course of the puerperium. However, we believe after our observations of the past few months, that sufficient emphasis has not been laid on this subject for all physicians to grasp the significance of, and institute adequate treatment for infections which may be so severe and damaging if unrecognized.

In the Out-Patient Department of the Woman's Hospital of Detroit, which admits only adult females, all new patients are catheterized. The specimen is given the usual chemical analysis and, in addition, cell counts and stained smears are made of all sediments. Those patients who have a pyuria, bacteriuria, hematuria or symptoms referable to the urinary tract are referred to the Urological Department for further observation. The result is that a large percentage of the new cases admitted, which include surgery, medicine, obstetrics, and gynecology, are investigated from a urologic viewpoint as most of these patients do have, or have had symptoms referable to the urinary tract.

During the first eight months of 1930, 505 new obstetric patients were admitted to the hospital. The frequency with which we found urinary tract symptoms in these pregnant patients led us to make some studies for the purpose of analysis and comparative observations of other investigators. As quite a few of the obstetric patients were young unmarried girls, our interest was aroused, and an explanation sought for the urinary tract symptoms manifested.

In our series of cases, there were 27 primipara and 31 multipara: 48 were antepartum and 10 were postpartum. Nineteen were completed cases, that is, those under observation from the early antepartum period to the cessation of their symptoms postpartum. The average age of the primiparous woman was twenty-two, as compared with the multiparous woman which was thirty. The average number of pregnancies among the multipara was 3.

We studied the symptomatology of these patients quite thoroughly and found the first symptom was frequency of urination. This oc-

curred in a greater percentage than any other symptom in each of the 4 groups. Next to urinary frequency, nocturia, smarting and burning, renal backache, and urgency, rank in the above order as regards frequency of occurrence. In those cases experiencing renal backache, 31.8 per cent complained of bilateral tenderness, while 22.7 per cent had unilateral renal pain. Of the unilateral group, 13.7 per cent had right kidney tenderness, as compared to 9 per cent with left kidney symptoms. This substantiates the findings of former investigators who found a greater percentage of right-sided renal infections. An average taken among this series of cases showed the above symptoms to begin at the fourth month. Chills and fever were found in a very high percentage of cases, especially in the postpartum group. These cases as a rule were acute, and seen by us in the hospital wards. Suprapubic pain was rather infrequent, occurring in 9 per cent of cases, and was generally experienced by patients suffering from a very severe cystitis or pyelitis. These cases responded satisfactorily to treatment.

Among the gastrointestinal symptoms, constipation ranked first in importance. This complaint, we think, was the most formidable of all, and at the same time the most rebellious toward treatment. It has been definitely proved by Francke that there is a direct communication between the lymphatics of the large bowel and those of the right kidney; and that there probably exists a similar situation on the left side. The importance of this fact can be readily appreciated since in pregnancy we know that there is a certain degree of urinary stasis in the kidney pelvis in most cases. The cause of this stasis, DeLee believes, is ureteral tortuosity, which is in turn due to hypertrophy and displacement of the pelvic organs. According to DeLee, a bacteriuria exists in a large percentage of healthy pregnant women due to constipation; thus an ideal situation is present for renal infection, because of poor renal drainage. This accounts, no doubt, for the high percentage of B. coli urinary infections found in pregnancy.

Nausea and vomiting occurred in 27.3 per cent of our cases. This symptom was usually a companion of chills and fever and was present mostly in the acute cases of pyelitis. Dyspepsia is another complaint listed with the gastrointestinal group. This term includes heartburn, epigastric distress, and gaseous eructations which proved to be secondary to other maladies as cholecystitis or gastric hyperacidity in most instances.

Under the term "miscellaneous" were grouped headache, vertigo and blurring of vision. Headache occurred in 34.62 per cent of cases and was associated in the great majority of instances with chronic upper respiratory infections or visual disturbances. In a certain number of patients, complaining of headache, vertigo, and blurring of vision, we were able to lay the blame on an elevated blood pressure, albuminuria or elevated nonprotein nitrogen retention. These symp-

toms have been illustrated in Table I, showing the percentage of occurrence for each symptom, in all 4 groups of patients.

TABLE I

		ANTEPARTUM		POSTPARTUM	
		PRIMIPARA PER CENT	MULTIPARA PER CENT	PRIMIPARA PER CENT	MULTIPARA PER CENT
Urinary symptoms	Frequency	63.2	46.1	100	80
	Smarting and burning	45.5	34.62	80	80
	Nocturia	58.8	38.4	40	60
	Edema of ankles	13.7	46.1	0	40
	Urgency	22.8	38.4	40	20
	Chills and fever	22.8	15.41	100	40
	Renal backache — Bilateral	31.8	23.11	0	20
	Renal backache — Right kidney	13.7	19.2	60	60
	Renal backache — Left kidney	9	0	20	0
	Hematuria	4.5	11.54	60	0
	Incontinence	0	15.41	0	0
	Suprapubic pain	9	7.7	0	0
G. I. symptoms	Nausea and vomiting	27.3	30.71	80	20
	Constipation	36.1	19.2	0	20
	Dyspepsia	0	7.7	0	20
Miscellaneous	Headache	27.1	34.62	40	0
	Vertigo	18.2	34.62	0	0
	Blurring of vision	4.59	23.11	0	0

Table II shows the presence of albumin, casts, pus, and the type of bacteria present in the urines of these patients. Positive tests for albumin and casts were infrequently seen, being found at the rate of 9 per cent and 4.5 per cent respectively. Practically 75 per cent of urines examined showed evidence of pus. Turbid urines, indicated in the chart by microscopic pus, were in excess of those specimens containing pus. B. coli infections were far more numerous than coccal types. The former were found in excess of the latter in the ratio of 4 to 1. This difference we believe can be accounted for by the presence of constipation. Several cases presented evidence of mixed infection. Approximately 30 per cent of our patients failed to show bacteria in the urine. Many specimens showed a bacteriuria in spite of clear looking urines, and conversely we were unable to demonstrate bacteria in several patients with turbid urines. This demonstrated the necessity of culturing all urines, and also examining a stained centrifuged sediment smear, before a final conclusion could be drawn. In several instances a report of "no growth on culture media," was proved spurious, when stained sediment smears of the same specimen showed many bacteria to be present. Our conclusions were that examination of sediment smears was far more reliable than cultures, although we always ordered cell counts, cultures, and smears on all urines.

In the cystoscopic examination of pregnant patients, one must remember that certain variations in the appearance of the mucosa and contour of the bladder are physiologic changes. Congestion was the

TABLE II

| | ANTEPARTUM | | | | | | POSTPARTUM | | | | | |
| | PRIMIPARA | | | MULTIPARA | | | PRIMIPARA | | | MULTIPARA | | |
	BLADDER PER CENT	RT. KIDNEY PER CENT	LT. KIDNEY PER CENT	BLADDER PER CENT	RT. KIDNEY PER CENT	LT. KIDNEY PER CENT	BLADDER PER CENT	RT. KIDNEY PER CENT	LT. KIDNEY PER CENT	BLADDER PER CENT	RT. KIDNEY PER CENT	LT. KIDNEY PER CENT
Albumin	9	0	0	3.86	0	0	0	0	0	0	0	0
Casts	4.5	0	0	0	0	0	0	0	0	0	0	0
Macroscopic pus	40.9	27.3	13.7	26.9	23.11	11.54	40	60	0	60	40	0
Microscopic pus	31.8	22.8	27.3	38.4	34.62	38.40	40	40	60	20	20	60
Staphylococcus organisms	9	4.5	9	7.7	11.54	3.86	0	0	0	0	0	0
B. coli organisms	27.3	31.8	18.2	19.2	26.9	15.41	20	40	0	60	40	0
Mixed infection. Staphylococcus and B. coli organisms	13.7	4.5	4.5	7.7	3.86	3.86	40	20	40	20	0	0
No bacteria	45.5	22.8	22.8	65.3	34.62	38.4	0	20	20	20	60	100

first indication of a change from the normal. This was most pronounced in the region of the trigone and internal urethral orifice.

The bladder contour undergoes a certain degree of distortion especially in the region of the trigone. These changes very often made themselves manifest as early as the second month of pregnancy, and as the uterus progressively increased in size, there was an upward displacement of the bladder. This in turn put the trigone on a stretch, and as a result it was lengthened and broadened. The distance between the ureteral orifices gradually became greater, and the inter-ureteric ridge assumed a rope-like appearance as the uterus became larger. Of 58 patients examined 85 per cent were cystoscoped, and in 73 per cent of these, evidence of cystitis was found.

Catheterization of the ureters was attended with a little more difficulty toward the late months of pregnancy. Ureteral obstruction was found in 10 per cent of cases. This condition was found in the right, left or bilateral ureter in the ratio of four, two and one respectively. Ureteritis was of rather infrequent occurrence; it was found only in the right ureter and in the percentage of 3.86.

Our investigations showed a predominance of right kidney infection in excess of left in the ratio of 3 to 1. Fifteen per cent of cases showed evidence of bilateral pyelitis.

Pyelograms were made on 40 per cent of our patients. These were practically all bilateral. A pyeloscopy examination was made in each case, on a specially constructed roentgenoscopic table for this purpose, prior to pyelography. We found this method of procedure an invaluable aid in visualizing through the fluoroscope the position of the ureteral catheters. In the past year at the Woman's Hospital we have never made a pyelogram without first visualizing the ureteral catheters and studying the motor function of the renal pelvis. For this we employed sodium iodide 30 per cent, just enough of the solution being injected to give a clear outline of the calices and pelvis. This usually took from one-half to 3 c.c. The great advantage of this procedure was that both kidney pelves could be examined simultaneously with impunity. As there was no overdistention of the kidney pelvis, the patients experienced very little if any discomfort.

The table employed for this work has a grooved holder on the under side of the fluoroscopic screen, into which can be placed a cassette so that films may be made with the fluoroscopic tube at any stage of the examination. In this way a rapid succession of pictures can be taken of the kidney pelvis at varying degrees of filling as well as emptying of the iodide solution. When the peristaltic activity of the pelvis and ureter had been sufficiently examined, the catheters were withdrawn under direct vision into the lower extremity of the ureters, injecting simultaneously with sodium iodide, a 14 × 17 cm. film being made with the patient prone. The table was then tilted vertically by an

electric motor, and a 14×17 cm. film of the entire injected urinary tract in the erect posture was taken anterior posteriorly, whereas the smaller films are taken posterior anteriorly and without a Bucky diaphragm. The catheters were then removed, and the patient was again studied fluoroscopically in regard to peristaltic activity, and emptying time of the kidney pelvis. Renal ptosis or rotation could be readily demonstrated. The amount of excursion the kidneys went through, with each respiration could be very clearly illustrated. This procedure was repeated at various angles by tilting the table back and forth, from the horizontal to the vertical plane. When the examination was completed besides having a bilateral pyeloureterogram in 2 postures for a permanent record, we had a mental picture of what

TABLE III

		ANTEPARTUM		POSTPARTUM	
		PRIMIPARA PER CENT	MULTIPARA PER CENT	PRIMIPARA PER CENT	MULTIPARA PER CENT
Cystoscopies		68.1	80.36	100	100
Cystitis		49.9	53.61	100	100
Ureteritis	Right	3.86	0	0	0
	Left	0	0	0	0
	Bilateral	0	C	0	0
Pyelitis	Right	18.2	19.2	20	40
	Left	0	7.7	0	0
	Bilateral	9	19.2	40	20
Ureteral obstruction	Right	9	11.54	40	0
	Left	4.5	3.86	20	0
	Bilateral	0	3.86	0	0
Pyelograms	Right	4.5	0	0	0
	Left	0	0	0	0
	Bilateral	13.7	19.2	40	80
Hydronephrosis	Right	13.7	11.54	0	20
	Left	4.5	3.86	20	20
	Bilateral	4.5	0	0	20
Ptosis	Right	0	3.86	0	20
	Left	0	0	0	0
	Bilateral	0	3.86	0	0

took place in the kidney pelvis and ureter during the injection of the iodide solution. Referring back to our notes taken of our fluoroscopic study, together with the reading of the pyeloureterogram films, we were able to arrive at a more accurate and complete diagnosis of the case.

In our series of cases, we found hydronephrosis and hydroureter to occur in the right kidney, in excess over the left, at the rate of 3 to 1. There were as many bilateral cases of this lesion as there were left-sided involvements. We also found that hydronephrosis existed in about the same proportion in multipara as primipara. The predominance of right-sided hpdronephrosis can be explained on the same basis as right ureteral obstruction. In regard to renal ptosis, we found this condition present on the right side, and bilateral in the

same proportion, namely, 3.86 per cent. Table III illustrates the percentage of occurrence of all the above-mentioned renal pathology in both primipara and multipara.

The question of treatment of these cases naturally had to be considered from various angles. After a complete urinary history was taken, a careful and thorough physical examination was made by one of us (Dr. Langlois); any patient found showing evidence pointing toward foci of infection in other parts of the body, was referred to other departments for treatment of the foci, and so far as possible, these were removed before active treatment of the urinary tract infection was begun. We feel that considerable comfort has been given these patients by the institution of early appropriate treatment. Those that had cystitis only, received daily bladder instillations of 1 to 3 per cent protargol until the infection and symptoms disappeared. Cases presenting symptoms of ureteral obstruction and pyelitis responded well to weekly or ten-day intervals of ureteral dilatations, followed by pelvic lavage of 1 or 2 per cent silver nitrate, collene or mercurochrome 2 to 5 per cent. The interval between pelvic lavages was gradually extended, as the urine showed signs of improvement. Besides the above local measures, these patients were instructed to take sodium bicarbonate, in teaspoonful doses, three times daily after meals. . .The alkali was alternated at two-week intervals with sodium acid phosphates and hexamethylamine in 10 grain doses, the former to be taken one half hour before meals, the latter one half hour after meals, three times daily, during the entire period of urinary tract infection.

We believe that many of our patients suffering from renal ptosis derived considerable relief from the wearing of abdominal supports. At first these patients were sent to surgical appliance firms to be fitted. This proved very unsatisfactory. In the past year, we have procured abdominal supports suitable for the correction of this condition, and have personally fitted these patients with an appropriate support for each individual case. The results from this procedure have been more than gratifying to both the patient and the physician. In order to insure ourselves of results, plain x-ray pictures were taken with the patient wearing the abdominal support, and one with the belt removed. These plates revealed a marked improvement of the situation. The patients wearing a support were instructed to put it on while in the recumbent position before rising from bed, and to wear it constantly. Of course, a certain number of patients, especially those with very low-lying pelvic kidneys were not benefited permanently by this appliance. Their symptoms, however, were ameliorated to the extent that we were able to carry them through their confinement without too much discomfort, until such time that a nephropexy could be performed.

Sufficient time has not yet elapsed for us to have observed many cases through and after delivery, since this investigation was commenced. However, those patients we did follow through showed that the length of time taken to clear up the urinary tract infection varied with the location and extent of the infection; also the month of its occurrence during the pregnancy. Those infections beginning in the second to the sixth month antepartum could be quite well controlled before the time of delivery, and as a result the patient's confinement was devoid of any urinary tract complication, and with the re-establishing of treatment after delivery, the infection usually disappeared at the third or fourth month postpartum. Infections beginning after the sixth month antepartum did not clear up until the fifth or sixth month postpartum. These patients very often had a stormy delivery with frequent exacerbations of acute pyelitis during the puerperium.

SUMMARY AND CONCLUSIONS

1. A study and analysis of 58 cases of urinary tract infections during or after pregnancy is here presented.

2. Infection, ureteral obstruction, hydronephrosis, and hydroureter of the right kidney occurred in excess of the left in the ratio of 3 to 1.

3. The organism causing the infection in the great majority of cases was B. coli; the predisposing factors were poor renal drainage combined with intestinal stasis.

4. The onset of urinary symptoms usually took place during the fourth month of pregnancy.

5. Certain physiologic variations in the mucosa and contour of the bladder began as early as the second month of gestation, and persisted until after delivery.

6. Pyeloscopy proved to be an extremely important adjunct to pyelography.

7. The necessity of making an early diagnosis of the urinary tract infection proved to be of paramount importance.

8. A careful search for and the eradication of all foci of infection, including constipation, proved most essential before success in treatment could be accomplished.

9. Our success in the treatment of these patients has been in direct proportion to the early institution of appropriate measures of treatment.

10. Patients with renal ptosis were greatly benefited by the wearing of properly fitted abdominal supports.

11. The importance of urinary tract infections as a complication of pregnancy has not been sufficiently emphasized in the past.

10 PETERBORO STREET.

STUDIES ON AVERTIN

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FOUR years ago I[1] reported certain chemical and pathologic studies on the inhalation anesthetics, chloroform, ether, nitrous oxide and ethylene, as well as on the commonly employed hypnotics and sodium amytal. In 1927, Eichholtz[2] demonstrated the anesthetic properties of a new drug, tribromethyl alcohol, known commercially as avertin, and first prepared by Willstätter and Duisberg[3] in 1923. During the past three years, this anesthetic has been widely used, especially in Germany, and several clinical and experimental studies concerning it have appeared. We became interested in the new drug as a means of inducing anesthesia in patients in whom inhalation anesthesia was contra-indicated, and have studied it in a manner similar to that employed in our investigations on the other anesthetic agents referred to.

METHODS

All determinations on dogs were made after eighteen hours of starvation, and initial blood specimens were obtained in the morning before the administration of the anesthetic. Only dogs that had not been subjected to previous experimental work, and that were evidently healthy, were used. The blood constituents determined were the nonprotein nitrogen, uric acid, urea nitrogen, chlorides, sugar, CO_2 combining power, acetone bodies, and lactic acid. Sodium oxalate was used as an anticoagulant, and a Folin-Wu filtrate was made within half an hour after the blood was taken. Nonprotein nitrogen and uric acid were determined by the methods of Folin, the urea nitrogen by the van Slyke-Cullen modification of the Marshall method, sugar by Benedict's procedure, chlorides by Whitehorn's method, CO_2 combining power according to the technic of van Slyke, and the acetone bodies by Bokelmann's modification of the Engfeldt method.

The specimens of human blood were similarly analyzed, except that creatinine was determined in addition, by the method of Folin and Wu. All values are expressed in mg. per 100 c.c. of blood, except the CO_2 combining power, which is written in volumes per cent. In our experiments on dogs, as well as in our operative procedures on women, avertin fluid, a solution in amylene hydrate, was used.

All the dogs were sacrificed after the experiment in order to study the tissues microscopically. Tissues were immediately placed in 10 per cent formalin and put through the usual histologic procedures. Dr. Williams kindly corroborated my interpretations of the histologic sections.

RESULTS

From Table I it will be seen that the first dog received small amounts of avertin, and surgical anesthesia did not follow until the dosage had been increased to 500 mg. per kilogram of body weight. During a period of four days, we had an opportunity to study the

TABLE I. BLOOD CHEMICAL CHANGES IN DOGS UNDER AVERTIN ANESTHESIA

DOG NO.	DATE	TIME OF VENEPUNCTURE	AVERTIN ADMINISTERED PER KG.	ANESTHESIA PRODUCED	N.P.N.	UREA NITROGEN	URIC ACID	CHLORIDES	SUGAR	CO_2	LACTIC ACID
1	2/27/30	11:00 A.M.	Before avertin administration		38	14	0.5	460	78	41	
	2/28/30	2:05 P.M.	120 mg. avertin at 11:29 A.M.	No real anesthesia	33			493	100	47	
	3/1/30		150 mg. avertin at 11:50 A.M.	No real anesthesia							
	3/3/30	10:00 A.M.	300 mg. avertin at 10:40 A.M.	No real anesthesia	37	14	0.6	508	80	51	
	3/3/30	1:30 P.M.	500 mg. avertin at 10:50 A.M.	Deep anesthesia	38	14	0.8	508	133	47	
2	10/6/30	11:30 A.M.	Before avertin administration		30	12	0.5	447	95	52	26
	10/6/30	12:15 P.M.	750 mg. avertin at 11:57 A.M.	Deep anesthesia at 12:01 P.M.	31	19	0.6	442	143	51	32
3	10/7/30	12:30 P.M.	Before avertin administration		34	18	0.5	459	91	60	33
	10/7/30	12:53 P.M.	500 mg. avertin at 12:42 P.M.	Deep anesthesia at 12:50 P.M.	33	18	0.6	465	100	56	29
	10/8/30	11:30 A.M.		Came out of anesthesia at 2:30 P.M. 10/7/30	30	17	0.6	478	95	52	27
	Averages for normal dogs before avertin administration				34	15	0.5	455	88	51	29
	Averages for dogs under deep avertin anesthesia				34	14	0.7	471	125	51	30

TABLE II. BLOOD CHEMICAL CHANGES IN WOMEN UNDER AVERTIN ANESTHESIA

CASE NO.	DATE	TIME	ANESTHESIA	N.P.N.	UREA NITROGEN	URIC ACID	CHLORIDES	SUGAR	CO_2	LACTIC ACID	CREATININE
1	9/20/30	10:00 A.M.	Before anesthesia	31.9	19.9	3.6	423	100	45.3	39.7	
		11:50 A.M.	Deep anesthesia	36.5	18.2	3.4	436	94	51.3	21.1	
2	9/30/30	1:10 P.M.	Before anesthesia	46.0	22.7	4.8	469	73	45.7	26.0	
		1:35 P.M.	Deep anesthesia	46.0	18.5	4.7	456	83	45.7	24.7	
3	10/ 3/30	10:10 A.M.	Before anesthesia	38.5	22.7	3.8	466	79	53.2	18.5	1.4
		10:45 A.M.	Deep anesthesia	37.5	20.2	3.6	430	95	53.7	18.5	1.5
4	10/29/30	10:05 A.M.	Before anesthesia	37.5	14.1	2.3	462	74	59.8		
		10:45 A.M.	Deep anesthesia	37.8	14.2	2.3	462	88	58.9		
		2:00 P.M.	Coming out of anesthesia	34.5	14.2	2.4	452	152	51.3		
5	5/ 5/30	10:15 A.M.	Before anesthesia	24.8		1.9	488	86	43.8	21.7	1.1
		10:40 A.M.	Deep anesthesia	25.0		1.8	477	88	37.2	22.0	1.1
		3:45 P.M.	Coming out of anesthesia	22.8		2.6	482	101	43.8	34.5	1.2
Averages			Before anesthesia	35.7	14.8	3.3	462	82	49.6	26.5	1.2
			Deep anesthesia	36.5	17.8	3.2	452	89	49.4	21.6	1.3

blood chemistry of this animal under increasing doses of avertin. It will be noted that the nonprotein nitrogen, urea nitrogen, uric acid, and CO_2 combining power of the blood remained practically stationary throughout the entire period, and that the only changes observed were an increase in sugar from about 100 to about 130 mg. per 100 c.c. of blood, and a slight increase in blood chlorides. From a study of the other dogs whose protocols are reported in Table I, we note that the only change in the blood constituents during deep avertin anesthesia consisted in a slight increase in the blood sugar.

In Table II are reported the findings in five patients who were subjected to avertin anesthesia. All of these women were operated on for some gynecologic indication, and in none was there any reason to suspect kidney or liver disease. In other words, they were all fairly healthy individuals, with some minor abnormality of the generative tract, such as a cystic ovary, an old complete tear, a retrodisplacement of the uterus, and were selected for study because of the nonmedical nature of the condition needing operative intervention.

The values in this table are in full agreement with those in Table I, and show that the various blood constituents were unaffected by the avertin anesthesia, except that the blood sugar showed a slight rise in four out of the five patients. The CO_2 combining power remained practically stationary, and there is no accumulation of lactic acid in the blood stream. It should be noted that the first two specimens of blood, taken "before anesthesia" and in "deep anesthesia" respectively, as noted in the table, were obtained before any ether was administered to the patient. The third blood specimen, however, labelled "coming out of anesthesia," was obtained after the administration of from one-half ounce to three ounces of ether during the operation, and this perhaps explains the relatively high blood sugar and lactic acid, and the lowered CO_2 combining power found in that group.

Histologic study of the liver and kidney tissues of the Dogs 1, 2 and 3, revealed no abnormal changes. Dogs 4 and 5 showed slight central fatty degeneration of the liver, but to no greater extent than is often noted in the livers of normal dogs. In other words, we observed no evidence of liver necrosis as a result of avertin anesthesia, when administered to dogs in the doses indicated in Table I.

DISCUSSION

Bruger, Bourne and Dreyer[1] tested the effect of avertin on liver function by means of the bromsulphthalein procedure of Rosenthal and White, and found that the drug had very little effect on hepatic function, comparing favorably in this respect with amytal and ether. Our histologic findings are in agreement with their results. However, in view of the manner in which avertin is detoxicated in the liver[5] it

does not seem advisable to use it in such conditions as eclampsia, in which liver injury is an outstanding factor.

Bruger, Bourne and Dreyer report no significant change in the CO_2 combining power of the blood in dogs under the influence of avertin, a finding which accords with our results. As stated above, our figures following the administration of avertin reveal no marked change in any of the blood constituents studied, except a very slight rise in blood sugar. The absence of a decrease in blood alkali reserve, and of an accumulation of lactic acid, as well as the presence of such a slight hyperglycemia, would indicate that the average dose of avertin (about 100 mg. per kilogram of body weight in the human) administered rectally, produces very slight, if any, acidosis; and in this respect avertin does not resemble the inhalation anesthetics, chloroform, ether and nitrous oxide, but rather the barbituric acid derivative, amytal.

It appears that in surgical anesthesia produced by avertin, anoxemia does not play an important rôle, as for example, in nitrous oxide anesthesia. It is possible, however, that it may have some effect on carbohydrate metabolism, similar to that reported with amytal by Hines, Boyd and Leese.[6]

During the past year I have used avertin as a basal anesthetic, together with small amounts of ether, in various gynecologic operations and have had no untoward results. I have also used it with satisfactory results in cases of cardiac disease where it was necessary to end pregnancy by means of abdominal hysterectomy, as well as in two conservative cesarean sections. I have, however, had no experience with it in the conduct of normal labor or in the treatment of patients suffering from eclampsia.

CONCLUSIONS

1. In women the administration of tribromethyl alcohol (avertin) in a dosage amounting to 100 mg. of the drug per kilogram of body weight, produces no change in the nonprotein nitrogen, urea nitrogen, uric acid, lactic acid, creatinine, chlorides, and CO_2 combining power of the blood, and only a very slight increase in blood sugar.

2. Anoxemia seems to play no appreciable rôle in the anesthesia produced by avertin.

3. Similarly, anesthesia in dogs, induced by 500 mg. of avertin per kilogram of body weight produces no appreciable change in the blood chemistry, as well as no signs of necrosis in the liver or kidneys.

4. No untoward results or symptoms have been experienced following the use of avertin as a basal anesthetic in a limited number of gynecologic operations which I have performed.

5. I have, furthermore, used this anesthetic in cardiac disease necessitating operative interruption of pregnancy with good effect.

6. Avertin anesthesia seems especially indicated in patients in whom general inhalation anesthesia is contraindicated, and who present no evidence of disturbed hepatic or renal function.

7. An important precaution in its administration is that the avertin solution be not heated above 40° C., as the drug is unstable at higher temperatures. A further precaution is that the patient be carefully watched during the early postoperative period, in order to prevent swallowing of the tongue.

8. I have had no experience with the use of avertin in the treatment of eclampsia, but on theoretical grounds, I am of the opinion that before we advocate its use in this respect it may be advisable to study the effect of the drug on animals with damaged liver and decreased hepatic function.

9. Avertin appears to be a safe basal anesthetic, when administered in amounts not exceeding 100 mg. per kilo of body weight, in patients with adequate renal and hepatic function.

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Though vaginal hernia is a comparatively rare condition the surgeon should be able to recognize and treat it appropriately. Etiologically it is practically always an acquired condition, pregnancy, ascites, and abdominal tumors being contributing factors. Anatomically it consists of a descent of the peritoneum of Douglas' pouch into the perineal body. Within this sac may be found fluid or intestinal coils. The hernia may occur below the vaginal mucosa and protrude into the vagina. Again the sac may find its way between the muscles and the rectal wall and appear as a bulging mass within the rectum. Finally it may separate the perineal muscles and appear under the skin of the perineal body.

Symptomatically one finds tumor formation presenting the various manifestations of hernia elsewhere, that is, transmission of impulse, increased size on straining, and reducibility. There may or may not be an associated rectocele.

Treatment consists in reduction of the hernial contents, isolation, closure, and fixation of the sac with excision of the redundant peritoneum, and closure of the weakened area by uniting the uterosacral ligaments, the serosa of the rectum and the posterior surface of the uterus. The support of the perineal floor is then restored as in any plastic perineal operation.

THEO. W. ADAMS.

PERNOCTON AS AN ANALGESIC IN OBSTETRICS AND GYNECOLOGY*

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THIS paper is a report on the results of the use of Pernocton at Sloane Hospital. It was used in 133 obstetric cases as an analgesic, and in 20 gynecologic cases as an adjuvant anesthetic.

Pernocton is a 10 per cent aqueous solution of the sodium salt of the secondary butyl-β-bromallyl barbituric acid. In the body it is transformed first into acetonyl barbituric acid, and then into other substances which are inert and practically nontoxic. They have been given to animals but did not produce a hypnotic effect. It has not been possible to trace pernocton in the urine, but only these transformation products in a quantity which corresponds to about one-fifth the amount of pernocton administered.

There has been developed in Germany an extensive literature on the subject of pernocton, but we have been unable to find reports of any work being done in this country.

Bumm of Berlin originally investigated this drug in 1926 and 1927. He concluded after his experiments with Somnifen that it produced undue excitation, that the postoperative sleep of twelve to twenty-four hours was too prolonged, and that there was definite evidence of renal damage in three cases. He felt that pernocton did not possess these disadvantages. Dogs were used as the subjects of his animal experiments. The minimum lethal dose was ten times the minimum effective dose, leaving rather a generous margin of safety. In lethal doses death was caused by paralysis of the respiratory center. Clinically he believed the intravenous route to be the method of choice. His average dose was 0.7 to 0.8 mg. per kg. of body weight (corresponding to 4 to 6 c.c. of the 10 per cent solution), supplemented with ether. This was preceded by morphine and atrophine. Respirations were quiet and of the same depth and rate. Blood pressure dropped from five to ten points, the pulse was not affected. The patients were sleepy for twenty-four hours and one-third of them showed postoperative restlessness. There was no nausea or vomiting. Uranalysis revealed no evidence of renal or hepatic damage. Bumm concluded that pernocton possessed distinct advantages over other drugs thus far developed for the production of anesthesia in surgery.

In a subsequent article reported on 80 additional surgical cases, he confirmed his original findings.

Goldschmidt reported favorable results on the use of pernocton in 52 labor cases. He used 1 c.c. per 12.5 kg. of body weight; the smallest effective dose being 3.5 c.c., and the largest being 7 c.c. There was complete amnesia in 62 per cent, and pain

was less in 66 per cent. A repeated dose was given to 20 per cent. He stated that suggestion is important and quite essential. His patients were unconscious for thirty minutes or more, after which they would answer questions which they did not remember later. Occasionally the pains would be lessened for twenty to thirty minutes. When there was too great a diminution of contractions pituitrin was given. The average blood loss was 330 c.c. Most of the patients awakened after the end of the third stage. Less ether was used for repair work. He reported two infant deaths, one of which was in a premature and the other a forceps delivery. Autopsy reports were not given.

Goetz gave his conclusions after using pernocton in 50 obstetric cases with both spontaneous and operative deliveries, including one cesarean section. His dosage was 1 c.c. per 10 kg. of body weight. He emphasized the importance of slow injection to prevent excitation. The patients had a complete amnesia but were restless on awakening. The drug was given to primiparas at full dilatation and to multiparas shortly before that stage. No effect was noted on the infants and there were no maternal deaths.

Hole used the drug in 120 cases, also employing the intravenous route. He gave it when strong contractions, lasting at least twenty seconds, were coming at twenty minute intervals. Dosage varied from 4.4 c.c. to 7.5 c.c., depending upon the patient's weight. Repeated doses from 1 to 2 c.c., up to two doses, were given. One hundred and eight had an ideal amnesia, but 25 were more or less excited. Pituitrin was used to stimulate contractions in fifteen cases.

Wolfgang Schmidt confirmed the results of Goldschmidt, Hole and Goetz in 100 obstetric cases. Twenty-six per cent of his cases showed varying degrees of restlessness, several having urinary and fecal incontinence.

Braun was quite enthusiastic about its use in both surgery and obstetrics. In minor gynecologic operations he found no additional anesthetic necessary.

Alke has used pernocton for two and a half years in over 1200 surgical cases. His series included both adults and children and even nursing infants. At first he used the usual dose, 1 c.c. per 12.5 kg. of body weight, preceded by morphine and atropine, but subsequently used smaller doses, 1 to 3 c.c., merely as an adjuvant to ether, and the preliminary medication was omitted. He claimed that the amount of ether was reduced by 50 to 90 per cent. Suggestion was largely employed and the excitement stage with ether was eliminated. There was no postoperative restlessness. Pernocton was not used in shock or in patients with low blood pressure. No undesirable effects were noted from its use. In children relatively larger doses were employed, usually 1 c.c. per kg. of body weight.

Hartung agreed with Alke that pernocton was best used as an adjuvant to ether, and that it should not be given in large doses to produce anesthesia alone. He also stressed the importance of suggestion. He warned against morphine and pernocton together because of the danger of respiratory paralysis. One death in his series of 52 cases was reviewed and the fatality was laid to this cause, although there was no autopsy. This patient had ¼ gr. of morphine and 5 c.c. of pernocton. A combined operation on the kidney and hip joint was performed. Shortly following the operative procedure the respirations became slower and more shallow and then ceased. They were revived with respiratory stimulants and were of the Cheyne-Stokes type. After a short time the patient died. Hartung concluded that pernocton was a valuable refinement in anesthesia but that it should be used in medium doses, 4 to 6 c.c., and in conjunction with ether or nitrous oxide.

Pernocton is marketed in a 10 per cent solution in 2.2 c.c. ampules. This is suitable for either intravenous or intramuscular injection. In our cases the intravenous method was used exclusively.

No attempt was made to accurately regulate the dosage according to body weight. In the obstetric group women of average weight and stature received 4.4 c.c. as the usual initial dose; and this varied according as she were either over or under average. The minimum dose was 2.2 c.c. and the maximum 6.6 c.c. When repeated, 2.2 c.c. was the usual amount; but 4.4 c.c. was given on several occasions.

OBSTETRIC GROUP

Labor was well established with strong uterine contractions, at three to five minute intervals, before injection was given.

One hundred patients were in the first stage of labor, 47 early (with the cervix three fingers' dilated or less), and 56 late (with the cervix from three fingers' to almost complete dilatation). Thirty-three were in the second stage, 23 early (with full dilatation), and 10 late (with the caput on the pelvic floor). The injection was given between pains, and never faster than 1 c.c. per minute. The importance of slow administration should be emphasized, for when the drug is given rapidly there is apt to be a sudden drop in blood pressure and marked excitation.

Effect on the Mother.—We found that the patients usually passed into what seemed to be a deep sleep before the injection was completed. There was occasional moaning during contractions, but in the intervals there was a return to complete unconsciousness. This state lasted from thirty minutes to four or five hours. When the analgesic effect of the pernocton began to wear off, the patients would sometimes cry out during a pain, but did not remember it later. Respirations were occasionally slowed, but only slightly, and then tended to be deeper. Pulse and blood pressure records showed only the normal variations for labor. The greatest drop recorded in blood pressure was twenty points. Uterine contractions were occasionally diminished; in three cases the pains ceased for twenty to thirty minutes, but then returned, gradually attaining their former intensity. However, in the majority of cases the contractions were either unaffected or definitely increased as to frequency and duration. This was particularly noted in a number of cases when pernocton was given early in the second stage and delivery followed almost precipitously.

The only undesirable effect noted was restlessness. Six women showed marked motor excitability, continually rolling and tossing about in bed and crying out with pains. Three of these patients became sufficiently unmanageable to need restraint. Where this was encountered it was observed that the patients were Latins of a volatile temperament, often unsuited to the protracted nervous and physical strain of labor. Eighteen women were moderately restless but required no restraint. These patients had varying periods of amnesia, and when later asked their opinion of pernocton, said it had given them relief.

The results in 46 cases were recorded as very favorable. In this group the patients were apparently entirely relieved of pain after injection and had complete amnesia for the events of labor and delivery. In 72 cases the effect was moderately favorable. Here the patients experienced some pain when the effects of the pernocton wore off before delivery, and they had a partial amnesia. In three cases there was no relief. Their pain was not relieved nor was there any clouding of consciousness. Possibly the uncooperative attitude of the patients was partly responsible for their lack of relief.

After the initial injection 6 patients delivered in thirty minutes or less, 18 in thirty minutes to one hour, 35 in one to two hours, 25 in two to three hours, and 36 in over three hours. The average duration of labor was eighteen hours.

There was spontaneous delivery in 90 cases, low forceps in 25, midforceps in 2, and breech extraction in 3. This corresponds favorably with the usual figures.

There was one neonatal death following breech delivery; an autopsy revealed a broken neck. There were 32 episiotomies. The majority of cases required supplementary anesthesia, either nitrous oxide or ether, during the actual delivery.

In this series there were 120 primiparas and 13 multiparas. Ninety-six were typed as having a normal pelvis, 8 funnel, 7 flat, 7 generally contracted, and 2 male.

Maternal Mortality.—There was one maternal death. Mrs. K. K., Japanese, aged twenty-one, primipara, entered the hospital at 9:00 A.M. December 2, 1930, in labor, pains having begun at 7:00 A.M. Her pregnancy was uneventful and physical examination negative. Laboratory findings were normal. Her temperature on admission was normal. Labor progressed satisfactorily and at 2:25 P.M., after she began to complain of her pains, she was given pernocton. After about 2 c.c. had been injected she became extremely restless, jerking her arm so that the needle became dislodged from the vein. At 2:50 P.M. she was given an additional 2.2 c.c. Following this she slept quietly between pains for about thirty minutes, after which she again became restless. The caput was on the pelvic floor and as there appeared to be no advance it was decided to take the patient to the delivery room. She was there given an ether anesthetic, which was taken badly, and episiotomy and low forceps delivery were performed at 4:10 P.M. The baby was in good condition. There was no unusual blood loss, but during and following delivery her pulse varied between 120 and 130. She coughed up considerable mucus. Consciousness was regained shortly after delivery. At 5:30 P.M. her condition was noted as fair, the pulse remaining elevated and the cough persisting. At 6:00 P.M. there was marked restlessness, the cough was more severe and blood tinged sputum was being raised with difficulty. At 7:00 P.M. there was dyspnea and cyanosis and her condition was distinctly worse. One-fourth gr. of morphine and 1/150 gr. of atropine were given. Her breathing became still more difficult and 10 gr. of caffeine-sodium-benzoate was given subcutaneously. There was at this time profuse bloody sputum. A nasal catheter was inserted and oxygen and carbon dioxide were administered without improvement. Respirations ceased at 7:30 P.M., three hours and twenty minutes after delivery. Artificial respiration was resorted to for fifteen minutes without avail.

The cause of death was thought to have been a pulmonary embolus, but autopsy, limited to the chest and abdomen, failed to reveal such a finding. There was however an early bronchopneumonia. Large groups of alveoli were hemorrhagic and contained many polymorphonuclear leucocytes. There was no infiltration of the alveolar septa. This pneumonia was not deemed sufficiently advanced to have caused her death. But on the other hand, in view of the patient's course, we did not feel that pernocton either was the direct cause of death, but was probably contributory.

Effect on the Baby.—Ten babies were noted as slow in breathing. They all responded to the usual methods of stimulation, only one requiring tubbing. Their subsequent course was normal.

GYNECOLOGIC GROUP

Pernocton was employed either as an adjuvant to nitrous oxide or alone in 20 operations.

There were included 4 hysterectomies, 2 abdominal hysterotomies with sterilization, 6 vaginal plastic repairs, and 8 curettages, 4 of which were followed by insertion of radium. The average dose was 6 c.c., the largest being 8 c.c. and the smallest 5 c.c. As in the obstetric cases, the dose was governed roughly by body weight. One patient received an additional injection of 1 c.c. Sixteen were given preliminary medication consisting of 1/6 gr. of morphine and 1/200 gr. of scopolamine.

One patient was definitely excited by the morphine and was later found to have an idiosyncrasy for it. Nitrous oxide was necessary in 10 cases to supplement the effect of pernocton.

All the patients were unconscious before the completion of the injection, usually by the time 4 c.c. had been given. Involuntary movements of the hands and feet and turning of the head from side to side were observations made in 8 cases. All of these were eventually given nitrous oxide. Immediately following the injection in two, there was hiccough lasting for two or three minutes. Fibrillary twitching of small muscle groups was noted in several patients. The others remained in what appeared to be a natural sleep and were well relaxed until varying periods after operation. There was no depression of the respiratory rate below the normal even in cases where pernocton had been preceded by morphine. In several cases, however, the rate was elevated due to nervousness on arriving in the anesthesia room, but after the injection promptly returned to normal. The breathing was regular and deep. No unusual effect was observed on the pulse. There was a fairly consistent drop in the systolic blood pressure, the average being 20 points. The greatest drop was 40 mm. In ten to fifteen minutes there was, however, a gradual rise to approximately the former level. Either before or during the operation 10 patients became restless necessitating the addition of nitrous oxide.

Following operation, consciousness was regained in periods varying from thirty minutes to six hours, with an average of two hours. During this period several patients were restless, frequently turning from side to side and had to be watched carefully to prevent their falling out of bed. They all remarked that the usual fear of the anesthetic was entirely eliminated. Nausea was rare and vomiting was absent. There was a marked decrease in the use of sedative postoperatively for the first twenty-four hours.

Two illustrative cases may be briefly reviewed. One of these was a woman of seventy-four years with menorrhagia and weighing 180 pounds. She had a marked degree of senile dementia, and consented to come to the hospital only after great urging and the promise that there would be no operation. It was evidently impossible to take her to the operating room while she was conscious without resorting to force. This being undesirable it was decided to give her pernocton in the room. She received 6 c.c. intravenously and promptly went off to sleep. The trip to the operating room was uneventful. The operation, a curettage and insertion of radium, was performed without difficulty and she was back in her bed several hours before awakening. She never knew that an operation had been done. Another patient with fibroids and relaxed pelvic floor had a chronic bronchitis and it was desirable to avoid ether. Following an injection of morphine she was given 6 c.c. of pernocton, which produced such an ideal anesthesia that the administration of nitrous oxide, which had been planned, was postponed until it should be necessary. The operation consisted of dilatation and curettage, perineorrhaphy and supravaginal hysterectomy. No additional anesthetic was used throughout the entire operation; relaxation being good until the closure when suture of the peritoneum caused slight restlessness. The operation lasted one hour and twenty minutes. Consciousness was regained in seven hours, there was no nausea or vomiting and the only sedative necessary was allonal.

SUMMARY

Gynecologic Cases.—Pernocton was employed in 20 gynecologic cases, in 10 of which it was supplemented by nitrous oxide or oxygen. The operations included 6 laparotomies, 6 vaginal plastic repairs, and 8 curettages. The average dose was 6 c.c., intravenously, preceded by morphine in 16 cases. The immediate effect was unconsciousness but

there was restlessness appearing at varying intervals in 10 cases and when this occurred nitrous oxide inhalations were begun. The usual unpleasant experience of induction by ordinary methods was eliminated. Several patients were moderately restless after returning to their beds. Postoperative nausea was rare and vomiting was absent. There was a marked decrease in the use of sedative for pain after operation.

Obstetric Cases.—Pernocton was used in 133 labor cases. The usual dose was 4.4 c.c.; in a few instances 2.2 c.c. was used; and less frequently 6.6 c.c. was given. A repeat dose was given twelve times.

The first injection was given to 100 patients in the first stage and to 33 in the second.

The effect on the patient was either very favorable or moderately so in 130 cases, there being complete relief of pain for varying periods of time, from thirty minutes to four hours. Amnesia was also a fairly constant effect.

In 3 cases there was no apparent relief.

Twenty-four cases showed varying degrees of restlessness, several requiring restraint.

No untoward effects were noted on the pulse, respiration or blood pressure.

The average duration of labor from the initial injection to delivery was approximately three hours. The average labor was eighteen hours. Delivery was spontaneous in 103; low forceps were used in 25, midforceps in 2, and there were 3 breech extractions.

Ten babies were slow in breathing and required mild stimulation.

There was one maternal death which cannot definitely be ascribed to pernocton, although autopsy failed to reveal the actual cause. One neonatal death occurred following a breech delivery, autopsy revealing a broken neck.

In conclusion it may be said that in our opinion the use of pernocton is a distinct refinement in anesthesia. Oftentimes it may be used as the sole anesthetic agent. When supplemented by an inhalation anesthetic, the amount of that substance needed was markedly reduced.

We believe the use of pernocton in labor is a distinct advance in obstetric analgesia. The relief of pain and the accompanying amnesia are the most notable of the effects. The fact that there is no tendency to prolong labor is important. In this connection it has a distinct advantage over rectal analgesia and morphine. The occasional tendency to produce excitation is apparently the only unhappy finding. There is no tendency for the baby to be dangerously narcotized, and except for the questionable maternal death we believe it to be, in ordinary doses, without danger to the mother.

Note: Since reading this paper slight modifications have been made in the methods employed in the gynecologic cases. Smaller doses are given, the maximum being 5 c.c., and the pernocton is always supplemented by some form of inhalation anesthesia, usually nitrous oxide and oxygen.

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THE EFFECT OF ANTERIOR HYPOPHYSEAL IMPLANTS UPON SENILE OVARIES OF MICE*

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IN THE last decade many advances have been made in our understanding of the physiology of the sex cycle. Of especial interest are the studies that deal with the hormones of the anterior lobe of the hypophysis and their relationship to the ovary.

The probability of some relation in function between the hypophysis and the ovary has long been evident as a result of clinical observation. Until recently, however, there was very little experimental proof. It is known that tumors of the hypophysis cause abnormal growth and sexual prematurity.

Aschner has shown that regressive changes take place in the genitalia following partial or total extirpation of the hypophyseal gland. The striking clinical picture of dystrophia adiposo-genitalis is also significant in this connection. Erdheim and Stumme have pointed out that during pregnancy the anterior hypophysis hypertrophies and may give the features of the pregnant woman an acromegalous appearance. The occurrence of hypoplasia of the genitalia following roentgen irradiation of the hypophysis in rabbits, a fact established through the efforts of Frankel and Geller, further suggests such a relationship. Ten years ago, Reye and Budde described the clinical picture of hypophyseal cachexia. This malady is characterized by a profound body weakness, loss of the axillary and pubic hair, and cessation of menstruation in young women. It is significant that the administration of anterior hypophyseal extracts remedies the condition while a withdrawal of this therapeutic measure brings about a return of the symptoms.

The beginning of our recent and important advance in the true interpretation of the physiologic action of the anterior hypophyseal hormones is found in the epoch-making work of Evans and Long. Their studies are responsible for the great flood of experimental data dealing with the pituitary gland. Employing extracts obtained from the anterior lobe, they were able, by means of prolonged intraperitoneal injections, to produce giantism in rats. All of the organs in the body were enlarged, with the exception of the uterus. The ovaries in these experimental animals were double the weight of the ovaries in the control animals. A great amount

*Read at a meeting of the Obstetrical Society of Philadelphia, January 9, 1931.

of lutein tissue was found around the ova of the unruptured and atretic follicles. The estrual phases took place at long intervals and sometimes ceased altogether. They concluded from their results that the anterior hypophysis contains, in addition to the growth-producing hormone, a second hormone that induces luteinization of the follicles without preceding ovulation, and retards or even suppresses estrus.

Quite in contrast to these observations were those of Smith and Engle in this country, and Zondek and Aschheim, in Germany. Working independently and almost at the same time, they began to employ gland implants instead of gland extract in injections. Smith and Engle's technic differed somewhat from that of Zondek and Aschheim, but their results were practically the same. Their technic consisted of repeated implants in immature female mice and rats of a weaning
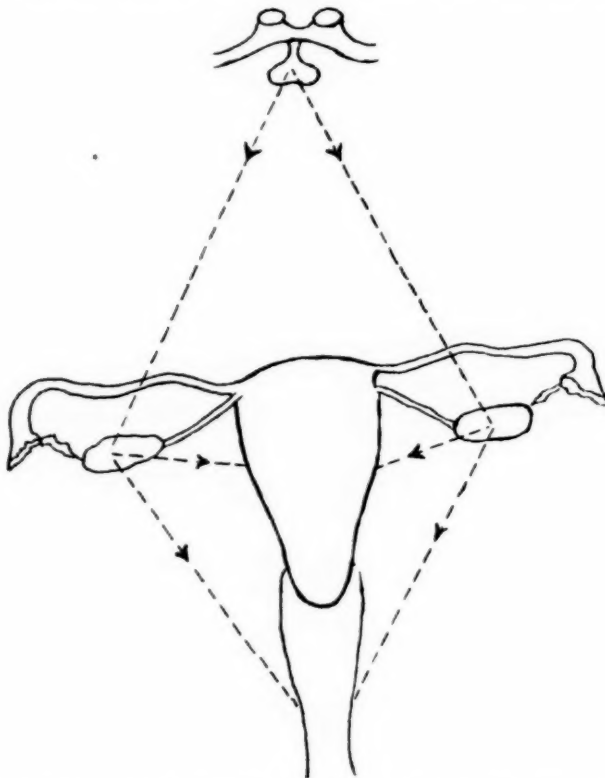
Fig. 1.—Schematic drawing showing the direct effect of the anterior hypophyseal hormone upon the ovary; the mobilized ovarian hormone secondarily affects the uterus and vagina. (After Zondek and Aschheim.)

age, which were employed as test animals. The effect upon the genitalia was marked. The uterus became hyperemic and distended. The ovaries grew distinctly larger and exhibited a number of corpora lutea. Superovulation was the rule in their experiments.

Zondek and Aschheim, on the other hand, used immature female mice weighing 6 to 8 gm. as test animals, on the assumption that weight was a more accurate criterion of immaturity. Their technic differed further in that they used only a single implant. They have repeated their experiments many times and, as a result of their observations, it may be stated that one hundred hours following the implantations of anterior pituitary gland substance there occur definite changes in

the ovaries and the lower genital tract. The ovaries increase in size to a considerable extent and there is a marked hyperemia with hemorrhage into the follicles. Maturation of follicles follows with the subsequent formation of corpora lutea. The uterus becomes distended and the vagina shows the characteristic changes of estrus. These results present an interesting contrast to the retardation of ovulation and the imprisonment of ova, which are consequent to the use of extracts as noted above in the experiments of Evans and Long.

Taken together, the experiments noted clearly demonstrate that the anterior lobe of the hypophysis contains powerful hormones capable of producing general growth or giantism of the organism, maturing infantile ovaries, initiating ovarian function, and bringing the entire follicular apparatus into play, with the resulting production of folliculin, the estrus-inducing hormone. It is important to remember
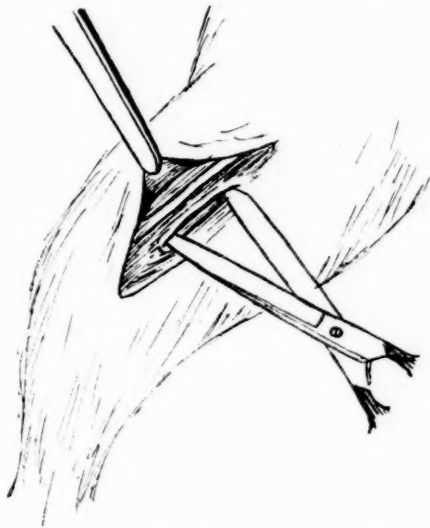
Fig. 2.—Technic of implantation (1). (After Zondek.)

that the hypophyseal hormones act only by way of the ovary and have no direct effect upon the uterus and vagina, as shown by control experiments on castrated animals. The action of the pituitary hormones, of course, leads secondarily, by its stimulation of the ovary, to the production of the so-called female sex hormone in the graafian follicle, the corpus luteum, and the placenta, and these do affect directly the lower genital tract. (See Fig. 1.)

The experiments to which we wish to draw your attention were supplementary to those described of Zondek and Aschheim. As it appears that the anterior hypophysis is the agent responsible for ovarian activity, and that a small implant brings about sexual maturity in infantile mice through activation of the ovaries, it seemed to us that it would be of interest to study the effect of similar implants in old, sexually degenerated nonestrus mice. The problem was to

determine whether senile animals, showing no estrus for a long time, could once again be brought to sexual function. A further problem was to ascertain whether the reestablished ovarian activity could be prolonged over a considerable period of time without the intervention of further stimulation. Finally, it remained to be seen whether ovulation with subsequent gestation could be reestablished in these senile menopausal mice.

The following experiments were carried out in the laboratories of the Charité Frauenklinik, Berlin, under the personal supervision of Professors B. Zondek and S. Aschheim, and later in America. Reference to the results obtained by the author is made by Professors Zondek and Aschheim in a previous communication. We wish to
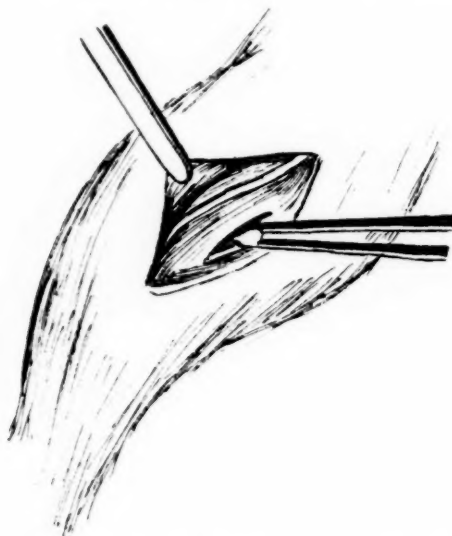
Fig. 3.—Technic of implantation (2). (After Zondek.)

make a preliminary report of the work at this time. It is our intention to confirm these results by further investigation, a complete report of which will be made at a later date.

Senile, nonestrus white mice were used as test animals. These old rodents, although known to be nonestrus for a long time, were nevertheless again closely observed over a period of several months. For this purpose, vaginal smears were employed as an index of the various sexual phases, in accordance with the findings of Allen, Long, Evans and others, who demonstrated the succession of changes in the vaginal lumen of mice and rats during the estrual cycle. The absence of such cyclic phenomena in old mice would therefore indicate the absence of ovarian or estrus-inducing hormone. Vaginal spreads, taken daily throughout this period of observation, failed to disclose a single estrual phase.

To secure the greatest possible accuracy in these experiments, the left ovary of some of the test animals was removed, to be used as a control, for comparison with the remaining stimulated ovary after implantation. The technic was simple and may be described as follows: Under ether anesthesia, a small incision is made over the lower part of the spine, the skin flaps are retracted and the ovary removed through a puncture wound in the muscle and fascia alongside the spine. The ovary, immediately after removal, is placed in Zenker's fluid and prepared for serial section. The incision is closed with linen thread. The entire procedure occupies only a few minutes.

At the same time that the unilateral oophorectomy is performed, each of the test animals receives a single implant of fresh anterior hypophysis of the cow. The implant is made as follows: A small slit is made over the adductor muscles of the upper thigh. The femoral artery is exposed and, with the aid of a fine pair of forceps, a piece of fresh gland, about the size of a pea, is inserted into the muscles lying beneath the artery. Care is taken not to sever the artery, for the success of the implant depends upon a good blood supply. The incision is closed with linen thread. (See Figs. 2 and 3.)

Four days after implantation, all the animals, twenty in the series, were found to be in estrus, as evidenced by the vaginal spreads. It may be assumed from this, that the implant is sufficiently potent to so stimulate the stagnant ovary that it can mobilize the latent, residual, follicular, estrus-inducing hormone and thus reestablish the estrual cycle in nonestrus old mice.

Attention was next directed to the further problem, whether the test animals, thus brought to an estrus phase, would continue to have further successive periods. Vaginal smears disclosed twelve additional cycles, covering a period of two months, without the intervention of further stimulation. The single implant produced not merely a single estrual phase but activated the senile ovary sufficiently to bring about many successive estrual cycles. These results would perhaps warrant the important and striking conclusion that the prolonged effect is not dependent upon the continued integrity and activity of the implant itself; that it is sufficient that the implant is present long enough to stimulate the stagnant ovary and initiate ovarian activity. This, once started, seems to continue by its own momentum, notwithstanding regression of the implant itself thereafter. We may be justified, therefore, in regarding the implant not merely as a substitutive therapy, but rather as an activator like the crank of a gasoline motor. It sets other forces in motion, and, once these latent forces are awakened, it ceases to be essential. We hope in our future experiments to more conclusively demonstrate this point.

A brief résumé of the history of Test Mouse No. 021 will illustrate the situation. This mouse was observed by means of daily vaginal smears from January 15 to

March 18 and no estrual periods were noticed. On March 18, a unilateral oophorectomy was performed and, at the same time, an implant was inserted in the adductors of the thigh. Three days later, on March 21, estrus was observed for the first time. Without the aid of further stimulation of any kind, estrus was again observed on the following dates: April 4, 10, 15, 22, 26, 30, May 5, 10, 15, 20, and 22. It is to be noted that the intervals, which range from two to seven days, making an average of not quite five days, compare favorably with the four-day periods characteristic of normal, young, mature mice. On June 5, while it was in a state of estrus, the mouse was killed. Autopsy revealed the remaining ovary to be markedly enlarged and highly hyperemic. The ovary was about ten times the size of the control and its surface presented a few hemorrhagic spots. The ovary was removed and serial sections made for comparison with the control.

There still remained the question whether, by means of the implant, ovulation might once again be induced, with subsequent gestation. The answer is found in the proctol of Test Mouse No. 0029.

Fig. 4.   Fig. 5.

Fig. 4.—Cross-section through the control ovary of mouse No. 025 before receiving implant. The ovary is small and atrophic, and contains many primordial follicles, lying in dense stroma.
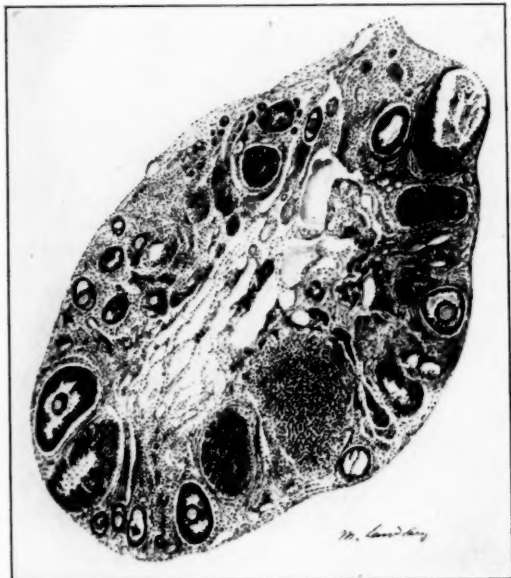
Fig. 5.—Cross-section through right ovary of same mouse, No. 025, ninety-six hours after implantation, taken at the height of estrus. (Same magnification as Fig. 4.)

The ovary is at least ten times the size of the control (Fig. 4) and is seen to contain many mature graafian follicles with their cumulis oophorae. A marked vascularization of its stroma and the presence of many highly developed corpora lutea is observable as well as a distinct increase of lutein tissue with well-developed interstitial glands.

This rodent was observed from January 17 to April 7 without finding a single estrual cycle. On April 7, it received an implant of anterior hypophysis. On April 9, it was found to be proestrus and, on the following day, a frank estrus was observed, which lasted until the sixteenth. Successive estrual phases were noticed on April 22, 28, May 4, 10, 16, 20, and 28.

During the night of May 28 and 29, the mouse was placed with a young, mature male mouse. Smears were not taken after mating for fear of interrupting gestation,

should one ensue. The animal was killed on June 4, and autopsy disclosed an unmistakable pregnancy in the left horn of the uterus. (See Figs. 4 and 5.)

CLINICAL APPLICATION

Although hypophyseal implants produce these results in small rodents, the effect they would have upon the human is a matter of conjecture. Experiments on monkeys may more closely approximate the results of similar experiments on the human being. Seitz refers to the results obtained in the experiments of Ehrhardt, who was able, by means of implants, to bring about a large, hyperemic uterus in two female monkeys. The ovaries, however, were free from corpora lutea.

In 1927, Ehrhardt and Wiesbader began experiments with human beings. They obtained fresh anterior hypophyseal gland, under sterile precautions, and implanted it in the subcutaneous fat of the adductors of the thigh. In many cases of amenorrhea, occurring in women upon whom various ovarian preparations had been used without effect, the menstrual periods were reestablished. The uterine scraping in these patients, after implantation, showed premenstrual changes and contained glycogen. In one patient with hypophyseal adiposity, who had never been pregnant, secretion from the breasts and swelling thereof was noticed. Many cases were followed up at subsequent laparotomies. In one case, the uterus was slightly enlarged and highly hyperemic, and gave the impression of an early pregnancy. In another case, three weeks after implantation, a large uterus and an ovary, the size of a hen's egg, were found. The latter resembled a degenerated ovary.

Up to the present time, no extract or other preparation of the anterior lobe of the hypophysis has been found, which when injected or taken by mouth has the physiologic effect of the gland implant. It is probable that such an extract would be of the greatest benefit in the treatment of amenorrhea and sterility, and therefore much to be desired.

CONCLUSIONS

1. The ovaries of old, sexually degenerated mice may be used as test objects for the effect of anterior hypophyseal implants.

2. These implants seem to be capable not only of initiating ovarian function in immature mice, but also of reestablishing ovarian activity in old, menopausal mice.

3. Hypophyseal implants apparently possess distinct stimulating properties by reason of the hormones which they contain: they do not continue to grow and produce additional hormones, but their effect upon the activity of the ovary seems to be continued even after their own activity has ceased.

4. It is suggested by these experiments that old, nonestrus mice, when once stimulated, can be kept sexually active for a considerable time without further stimulation.

5. The anterior hypophyseal implants may act by mobilizing the latent, residual hormones of the senile ovaries.

6. In one of the experimental animals, ovulation was restored and succeeded by the gravid state.

7. It is unwise to draw any sweeping conclusions from these experiments until they have been confirmed by others and repeated by us with similar results.

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Adler, L.:   Treatment of Vaginal Discharge.   Wien. klin. Wchnschr. **43:** 948, 1930.

The sources of vaginal discharge in both the very young and in adults are fully discussed as well as the more common methods of treatment. Altogether too much emphasis is placed on gonorrhea. Under the endogenous form of discharge, ovarian hypofunction, as evidenced by late menarche, irregular menstruation, amenorrhea, oligomenorrhea, and sterility, is stressed. Treatment should be directed toward increasing ovarian function by improvement of the general health, helio- and hydrotherapy, and the use of ovarian and anterior pituitary lobe preparations. Diathermy and X-ray, applied to the pituitary region may also prove efficacious. For local treatment the usual douches, topical applications and bougies are recommended.

Improvement with the dry form of treatment has been found to be transient, and for this reason has been discarded. Except in acute endometritis and pyometra, the uterine cavity is never the cause of discharge, and treatment directed toward it is valueless.

FRANK SPIELMAN.

PERFORATING CHORIONEPITHELIOMA OF THE UTERUS WITH FREE INTRAPERITONEAL HEMORRHAGE*

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CHORIONEPITHELIOMA, one of the most interesting of the pelvic tumors, may be looked upon, in a certain sense, as a physiologic process overstepping its normal bounds. The growth of the invasive and destructive cells of the trophoblast, which normally is checked when its function is completed by the nidation of the ovum and the formation of the placenta, becomes unlimited and leads to a widespread destruction of the tissues in immediate relation with the placental site. The continuous proliferation of the chorion epithelium produces a new growth made up of masses of syncytial and Langhan's cells, interspersed with the remnants of the tissues which they have invaded and infiltrated with the blood that corrosion of the blood vessels has set free. A more or less characteristic growth is thus produced, which has a tendency to invade the neighboring vascular channels and rapidly forms continuous local extensions and remote metastases. In the majority of instances the location of the growth is at the placental site within the adjacent layers of the myometrium; its predominant local extension is to the broad ligaments and the vaginal vault and its distant metastases to the lungs. The usual course of the disease is marked in the early stage by uterine hemorrhage, later by a palpable uterine enlargement and, after it has metastasized to the lungs, by cough and hemoptysis. There are many variations of the usual life-history of a chorionepithelioma and these seem to depend partly on accident and partly on the underlying cause of its development. For example, the growth of the syncytial masses and the tumor production may be more extensive in a near-by or in a metastatic area than it is at the original site, producing in this way atypical morbid anatomy and atypical symptoms. Furthermore the growth at the original site or in its local or distant extensions may regress spontaneously and disappear completely. Regression may occur at the original site only, or the tumor at its primary site having been removed by a surgical operation, regression may take place in distant metastases. A spontaneous cure may be laid to the development within the host of a syncytiolysin which is antagonistic to the proliferation of the fetal epithelium and ultimately destroys it.

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*Read before the Obstetrical Society of Philadelphia, January 9, 1931.

With this brief résumé of the interesting peculiarities of chorionepithelioma, we wish to report an atypical form of the disease which possesses a certain individuality and gives rise to unusual symptoms. We refer to a form of chorionepithelioma that perforates the uterine wall, through the serous coat into the peritoneal cavity, causing free and unlimited intraperitoneal hemorrhage and threatening life.   It
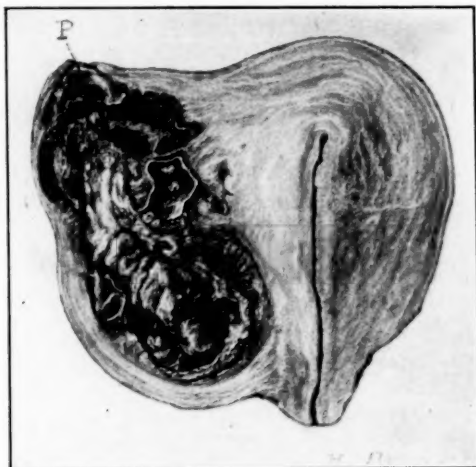

Fig. 1.—Perforating chorionepithelioma of uterus, situated in the anterior wall. No involvement of the uterine cavity; previous left salpingo-oophorectomy.   Clinical diagnosis: Tubal pregnancy, ruptured with free intraperitoneal hemorrhage. Questionable early abortion two months before. (From Anspach's *Gynecology*, J. B. Lippincott Co., Philadelphia.)

Fig. 2.—Perforating chorionepithelioma of uterus, situated in the anterior wall. No involvement of the uterine cavity; previous left salpingo-oophorectomy.   Clinical diagnosis: Tubal pregnancy, ruptured with free intraperitoneal hemorrhage. Questionable early abortion two months before. (From Anspach's *Gynecology*, J. B. Lippincott Co., Philadelphia.)

is by nature quite akin to a tubal pregnancy which ruptures the tubal wall by the corrosive powers of the chorion epithelium and nearly all the cases of perforating chorionepithelioma on record have been diagnosed as ruptured ectopics previous to operation. These perforating chorionepitheliomas are often situated within the uterine wall

and exhibit no communication with the uterine cavity. Of special distinction, therefore, in their symptomatology is the absence of profuse external uterine hemorrhage. It frequently happens that the symptoms are, up to the time of perforation, trivial. The sudden development of a tragic situation at that time and the need for recognition of the true nature of the condition, have led us to report our own case and review seven others found in the literature.

<div align="center">CASE REPORT</div>

History and Clinical Course.—Primipara, twenty-one years old, married four months. The menstrual periods were regular up to the time of marriage. Conception took place immediately thereafter; no periods occurred during the following two months, at the end of which she aborted. From that time on with the exception of one week she ''spotted'' nearly every day. About two and one-half months after the abortion, the patient was suddenly seized with severe abdominal pain and nausea. In a few minutes she exhibited difficulty in speech, complained of weakness, and sank into a condition of semiconsciousness. A physician summoned during the attack found the woman aphasic and unable to move the right arm or the right leg. On further examination cerebral irritability and dyspnea were apparent. Her pale features and a weak, rapid pulse, suggested an internal hemorrhage. Abdominal palpation disclosed generalized tenderness and signs of intraperitoneal fluid.

The acute onset of the symptoms, the history of spotting for two and one-half months, the blood studies, and the physical findings warranted a diagnosis of ruptured ectopic pregnancy and immediate operation was performed.

The abdominal cavity contained a large amount of free blood. The right tube and ovary were normal; the left tube and ovary were missing (operation several years before). The uterus exhibited a purplish-red protuberance about the size of a walnut on the anterior surface of the fundus. At the summit there was a small perforation, from which blood was flowing into the peritoneal cavity.

As the operative findings suggested a perforating chorionepithelioma, supravaginal hysterectomy with removal of the adnexa was performed.

The aphasia and the hemiplegic symptoms accompanying the acute attack were of interest from the standpoint of a possible brain metastasis. After a neurologic and an ophthalmologic study, it was concluded that these symptoms were due to a lesion in the left cerebral hemisphere; whether occasioned by a metastatic focus or a cerebral anemia it was impossible to say.

Following a prolonged convalescence, the patient gradually improved in health and was discharged with instructions to return for x-ray studies and deep roentgen therapy. To our surprise an x-ray picture of the lungs showed a tuberculous lesion. It was not an active one and the patient was discharged in fairly good physical condition after receiving a course of deep x-ray treatments of the pelvis and abdomen.

The hemiplegic symptoms, which this case presented, are of interest because they masked for awhile the true nature of the illness. When such symptoms arise in a young and otherwise healthy woman, after an atypical abortion or the expulsion of a mole, they may be regarded as suggestive, at least, of metastatic chorionepithelioma and the condition of the pelvic organs should be carefully investigated.

It is interesting to note also that two independent conditions coexisted in the same patient, and yet bore no relation to each other. Pulmonary symptoms, like cough and hemoptysis, in such a case, might be attributed either to the tuberculous process or to a lung metastasis.

Pathologic Report.—Gross: The specimen consists of an amputated uterus, right fallopian tube, and right ovary. A left salpingo-oophorectomy has been performed previously as is evidenced by the remaining stump. The uterus measures 5 × 5 × 4½ cm. The normal contour of the uterus is interrupted by a nodular protuberance on the anterior wall. This measures 3½ × 4 cm., is purplish-red in color and is soft in consistency. The serosa of the uterus is smooth and intact except at the summit of the tumor, where it presents a ragged perforation about 0.4 cm. in diameter. A probe can be inserted easily through this opening into the myometrium.

On incising the uterus through the anterior wall, the uterine cavity is found to measure 3½ cm. in length, and to be lined by a thin, pink uniform endometrium without any gross lesion or break in its continuity of surface.

The myometrium of the posterior wall is of normal consistency and measures 1½ cm. in thickness. The anterior wall is markedly thickened and measures 3½ cm. from the uterine cavity to the serosa. Most of the anterior wall is taken up by a purplish-red, fleshy, friable mass. The growth is separated from the uterine cavity by a thick zone of normal myometrium, and is almost entirely encapsulated by a layer of musculature which separates it from the serosal covering. This capsule gradually becomes attenuated, toward the summit of the tumor, and there disappears at the site of the irregular, crater-like perforation.

The right tube measures 5 cm. in length and its thickness varies from ¼ cm. at the inner to 1 cm. at the outer extremity. The serosa presents a few tags of adhesions. The fimbriated end of the tube can be probed to the extent of 1 cm.

The right ovary measures 3 × 1½ × ½ cm. The surface is normal. Cross-sections reveal the presence of a few atretic follicles and old corpora albicantia. The ovarian stroma is normal.

Histologic: Sections through the uterine wall, including part of the tumor mass, show the presence of a typical chorionepithelioma. Large herds of Langhan's cells in strand formation are seen infiltrating the muscle fibers. The myometrium contains many large blood channels filled with red blood cells and trophoblastic elements. Large areas of extravasated blood with leucocytic infiltration and necrosis are seen everywhere. Syncytial masses and syncytial wandering cells are observed penetrating deep into the musculature.

A review of the literature of perforating chorionepithelioma with free intraperitoneal hemorrhage shows that it is a rare condition. The following cases have been collected, and are, in many respects, similar to our own.

CASE 1.—Erck, Theodore A., and Outerbridge, George W.

A young multipara, twenty-seven years old, was curetted for a supposed miscarriage and the material obtained suggested hydatidiform mole. Following curettage, her periods became very irregular. A two months' period of amenorrhea then followed, accompanied by morning nausea, and she thought herself pregnant.

Following a vaginal examination, the patient was suddenly seized with violent epigastric pain accompanied by prostration. The abdomen was found to be tender and rigid and signs of severe internal hemorrhage were apparent. The irregularity of the periods, together with the sudden onset of the abdominal symptoms, led to a preoperative diagnosis of ruptured ectopic pregnancy and immediate operation was advised. The peritoneal cavity was found to be filled with blood and blood clots. Both ovaries were moderately enlarged and cystic. The uterus presented several nodular protuberances and an area of erosion. The growth was situated in the fundus and had eroded the serosa without involving the uterine cavity. The perforation of the uterus was responsible for the internal hemorrhage. The malignant tumor had passed through an atypical course and had not been associated

with external hemorrhage. Supravaginal hysterectomy with removal of both adnexa was performed. The patient made a good recovery but on the first attempt at coitus, three weeks after the operation, a profuse external hemorrhage ensued. Examination revealed a metastatic growth in the vaginal vault. Cauterization of the growth increased the bleeding and tight tampon packing was required to control it.

Irradiation with radium was later resorted to with good results: there was regression of the metastatic growth and apparent cure.

CASE 2.—Roulland, H., and Durante, G.

A primipara, forty years old, married one year, was delivered of a dead, macerated, hydrocephalic child. Following delivery, the patient continued to bleed rather abundantly and curettage was performed. For two months following curettement she enjoyed good health. Then again external hemorrhage occurred. The uterus was found to be notably enlarged, and a diagnosis of myoma was made. Three weeks later, she suddenly developed signs and symptoms of profuse intraperitoneal hemorrhage. Emergency laparotomy revealed a perforation of the uterus. At the point of rupture a neoplastic mass was found attached to the fundus. A total hysterectomy was performed. The patient later developed a metastatic growth in the vagina. Death followed three weeks after operation. Histologic examination of the specimen disclosed a typical chorionepithelioma malignum.

CASE 3.—Nagelsbach, Dr. von.

A middle-aged woman, forty-seven years old, was brought to the hospital after sudden collapse. A few hours earlier she had been perfectly well.

One year before, the patient had been curetted for an abortion. Since then her periods had been irregular and toward the last occurred every two weeks. The preoperative diagnosis was uncertain, for although the patient presented symptoms of secondary anemia, these were not sufficiently marked to suspect free intraperitoneal bleeding.

At operation, two liters of free blood were found in the peritoneal cavity. Both tubes were free but the uterus was enlarged. A bloody protuberance was observed on the posterior aspect of the fundus and from it blood was seen trickling steadily into the abdominal cavity. The condition was recognized as chorionepithelioma and a supravaginal hysterectomy was performed. The patient died a few hours after the operation.

The extirpated uterus disclosed a small apple-sized tumor which on cross-section presented a hemorrhagic appearance. The growth took up the greater part of the myometrium, had destroyed some of it, and had broken through the serosa into the peritoneal cavity. The endometrium was free and uninvolved.

Histologically the tumor was found to be a typical chorionepithelioma.

CASE 4.—Hormann, Karl.

A woman aged thirty-eight, para viii, had a period of irregular bleeding that was followed by amenorrhea for four and one-half months. According to her family physician, the patient had given birth to an hydatid mole two years before admission. Pelvic examination disclosed a soft, tender mass on one side of the uterus. The operator thought this was either an extrauterine pregnancy or a pyosalpinx. Soon after the pelvic examination, the patient began to present signs of severe internal hemorrhage and peritoneal shock, followed by collapse. A ruptured ectopic pregnancy was diagnosed and an emergency operation was performed.

On opening the peritoneum, the abdominal cavity was found to contain about 1½ liters of free and coagulated blood. Attached to several loops of the small intestines, a soft tumor about the size of an orange was seen. Another tumor, the size of a walnut was found at the right uterine cornu which gave the impression of an interstitial pregnancy. A supravaginal amputation, with removal of the major part of the growth attached to the small intestines, was performed. Both ovaries

and the left tube were left in situ. Even after this handling of the pelvic organs, the condition was thought to be a ruptured, interstitial pregnancy. The malignant nature of the tumor was not suspected.

Examination of the extirpated uterus gave, grossly, the impression of an interstitial gestation. Incising the uterus disclosed that several parts of it were invaded by hemorrhagic tumors. The main growth was about the size of an orange and was situated at the insertion of the right tube. The point of rupture was found to be a slit about 2 cm. long on the summit of a tumor the size of a pigeon's egg, which was situated at the left tubal cornu.

Histologically, the growths proved to be typical chorionepitheliomas. The patient died six weeks later, with symptoms of secondary growth in the intestines.

CASE 5.—Young, Thomas.

A woman thirty years old, married three years, one child. Two months following the birth of an hydatidiform mole, while urinating, she was suddenly seized with an attack of violent abdominal pain. She became pale and soon lost consciousness. Examination disclosed exquisite tenderness over the uterus. Vaginal examination revealed a small, soft prominence on the right and posterior to the uterus. A diagnosis of ruptured ectopic pregnancy was made. On opening the abdominal cavity, free blood was found. The uterus and both adnexa were removed at operation. On the right fundus of the uterus there was a rounded projection, which, when sectioned, appeared to be encapsulated and composed of dark, red, friable tissue. A small part of the tumor mass projected as a sessile polypoid growth into the fundus of the uterine cavity, near the right cornu. Elsewhere the endometrium was smooth and normal. Situated on the posterior aspect of the left mesosalpinx, near the left cornu of the uterus, a small nodule with an eroded surface was seen. The nodule extended into the mesosalpinx, between the tubes and the ovarian ligament. The growth was friable and appeared neoplastic and seemed to be directly continuous with the growth in the uterus. Histologic examination proved it to be a typical chorionepithelioma. The question was raised by the pathologist, whether the growth in the mesosalpinx was really continuous with the growth in the fundus, or whether it was embolic in character.

CASE 6.—Jacobash.

A young woman, twenty-six years old, para ii, presented symptoms of irregular bleeding for several months. On vaginal examination, the uterus was found too large and irregular. The symptoms of irregular bleeding, together with pelvic findings, led to a preoperative diagnosis of multiple myomas. Two hours following the vaginal examination, the woman developed lower abdominal pain, and collapsed. She died in a few hours with symptoms of internal hemorrhage.

Autopsy disclosed free blood in the peritoneal cavity. Situated on the fundus of the uterus, a tumor the size of an apple was seen. Surrounding this tumor several smaller nodules were found. One of the nodules situated near the right tubal insertion had ruptured and constituted the source of the hemorrhage. The author's diagnosis was sarcoma telangiectoides hemorrhagicum multiplex uteri, but, in view of the date of the report and the clinical history and the description of the specimen, Erek and Outerbridge include it in their series. Hormann, who also reports this case, is likewise of the opinion that it should be classed as an example of perforating chorionepithelioma of the uterus.

CASE 7.—Young, Ernest Boyer.

Multipara, twenty-three years old; married three years; one abortion at three months and one full-term pregnancy two years ago. Her periods were regular until the last three months. Since then amenorrhea with symptoms of pregnancy. From time to time during the first month she had attacks of sharp, left, lower abdominal pain. The attacks usually lasted a few hours and disappeared. During the sec-

ond and third months, she experienced no attacks until the end when she was one day suddenly seized with severe generalized abdominal pain, accompanied with vomiting and fainting. She was rushed to the hospital under the diagnosis of ruptured ectopic gestation. On admission, the woman presented signs of shock and acute intraperitoneal hemorrhage. The temperature was subnormal, the pulse weak and rapid. Signs of free blood were elicited in the peritoneal cavity. Vaginal examination revealed the uterus to be enlarged, the cervix soft, and resistance was felt in the vaginal vault. Laparotomy disclosed the abdomen to be filled to overflowing with free blood and laminated clots of blood of different ages. The uterus showed a rupture, situated on a domelike mass, projecting from the fundus of the uterus. In attempting to raise the uterus, a small fetus of about three months popped out from the rent in the uterus. It was at first thought to be a rupture of the uterine end of the tube, but the cornu was found to be intact. As the patient's condition was incompatible with any extensive surgical procedure an elliptical incision was made and the ragged mass excised and the edges sewed together. The excised portion showed the process in the uterine wall to be a perforating chorionepithelioma malignum. Six months later a complete hysterectomy was performed, but the patient died ten days following the operation. No autopsy was performed.

The clinical course of most of the cases so closely resembled a ruptured ectopic gestation that this diagnosis was made five times in the eight cases reported. In three cases uterine hemorrhage previous to the rupture was noted, in three there had been a period of amenorrhea; in two there was spotting. In three cases the tumor involved the uterine wall and the endometrial surface was free, the growth being intramural; in three a similar condition probably existed but the report is not clear; in two the endometrial cavity was involved to a small degree.

It is significant and worthy of note that, in three cases, the acute symptoms arose almost immediately following a pelvic examination. It becomes apparent, therefore, that great care should be taken in making a pelvic examination in suspected cases. As a precaution, such examinations should be made in a hospital if possible.

The symptoms before rupture have been of little or no value in directing attention to the true nature of the condition. Very recently as an important adjunct to the diagnosis of chorionepithelioma, the Aschheim-Zondek biologic test for pregnancy has been utilized. The urine of women with chorionepithelioma or hydatid mole gives a pregnancy reaction about twelve times as strong as a two months' gestation. This test is not only valuable in making the diagnosis but also in estimating the prognosis.

In some cases reported in the literature but not included in our group because details are lacking, no symptoms of an internal hemorrhage were present and yet a perforating chorionepithelioma was found. Aczel reports the case of a primipara, twenty-two years old, who died, exhibiting symptoms of pulmonary tuberculosis. Autopsy revealed a nodular tumor situated in the posterior aspect of the fundus of the uterus with an area of perforation. In this case there had been no clinical symptoms of internal hemorrhage. Extensive metastases were found in the lungs, intestines, vagina, and cervix, all presenting the characteristic picture of malignant chorionepithelioma.

In another case, reported by Zahn, the patient, a woman forty-three years old, para v, presented symptoms rather of intestinal obstruction than of internal hemorrhage and the diagnosis was overlooked even on opening the abdomen. The patient died one hour and fifteen minutes after the operation. Autopsy revealed the uterus to be enlarged and on opening it a soft, highly vascular tumor was found at the left uterine cornu. A perforation was found on the posterior aspect of the uterus, big enough to admit the little finger. Considerable intraperitoneal hemorrhage had taken place with the formation of a retrouterine hematoma. The operator believed the tumor to be a placental polyp, but from the description, it was without much doubt a chorionepithelioma.

CONCLUSIONS

1. Perforating chorionepithelioma most often resembles a ruptured ectopic pregnancy with intraabdominal hemorrhage.

2. The symptoms before the tragic stage may be sufficient to direct attention to the pelvic organs.

3. The immediate cause of the perforation may be some form of traumatism, especially a vigorous, bimanual, pelvic examination.

4. The diagnosis cannot be made with certainty until after the parts have been exposed; the suspected tubes are free; the perforation is at the site of a localized enlargement of the uterine body.

5. The uterus must be removed well below the site of the newgrowth, but the acute and profound anemia forbids a complete hysterectomy.

6. The adnexa should be removed with the uterus and subsequent irradiation should be practiced.

7. We wish to mention especially the striking fact, that in at least two of the cases on record, symptoms of cerebral involvement have also been present.

8. It is also to be noted from the case reported by Aczel, that hemoptysis may be a precursor or accompanying symptom of perforation and also may cloud the actual diagnosis.

9. The biologic test advanced by Aschheim and Zondek should be utilized in all patients suspected of chorionepithelioma.

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END-RESULTS IN THE TREATMENT OF CARCINOMA OF THE CERVIX WITH RADIUM*

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THIS report deals with the end-results in the treatment of carcinoma of the cervix with radium as observed in the Gynecological Ward Service of the Jefferson Medical College Hospital under the direction of Dr. Brooke M. Anspach, since September, 1921. Irradiation therapy at that time was rapidly supplanting the radical operation for cancer of the cervix and had been adopted as the exclusive method of treatment in many clinics. While at the beginning of this period it was still felt that operation was the procedure of choice in the earliest cases, the idea was soon abandoned, and since the beginning of the year 1923, no case of cancer of the cervix early or late has been subjected to a radical operation. Our present report has to do with the irradiated cases only. The four operative cases are mentioned to make the analysis of our experience complete, but they are too few in number to serve as a base of comparison as to the relative merits of the two methods.

In submitting our results we have adopted the suggestions of George Gray Ward that statistics upon the subject should be uniform and present certain essential features so that reports from various sources may be easily compared one with the other or the figures added together may enable us to come to conclusions dealing with a larger number of cases.

Ward recommends:

1. "A uniform classification as to the extent of the disease.
2. "Five-year results of total treated cases, early and advanced.
3. "Five-year results of the early cases, that is, definitely confined to the cervix, operable cases.
4. "The operability rate.
5. "The primary mortality."

In addition to these suggestions we have also figured our cures upon the absolute and upon the relative basis as will be noted later.

At the outset it may be noted that from September, 1921, to September, 1930, 150 patients with carcinoma of the cervix were admitted to the gynecologic ward. All but 10 were treated; 2 refused; one died before treatment could be instituted; 7 cases were too far ad-

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*Read before the Obstetrical Society of Philadelphia, January 9, 1931.

vanced. Of the 140 cases treated, 63 were taken care of prior to September, 1925, and form the basis of our analysis of five-year cases.

Before proceeding with this analysis we wish to show several tables that we have prepared, dealing with all of our cervical cancer cases and presenting certain features of general interest.

Table I relates to the age incidence and parity. The majority were between the ages of thirty and sixty, about equally divided as to decades, with 30 per cent occurring before the age of forty years. The youngest patient, twenty-two years of age, was treated two and one-half years ago and is living and well; the oldest patient, seventy-nine years of age, died four months after treatment. Six per cent of the patients were nulliparous.

TABLE I.   AGE INCIDENCE AND PARITY, 1921-30

DECADE	CASES
20-30	6
30-40	39
40-50	42
50-60	43
60-70	18
70-80	2
Youngest patient	22 years of age
Oldest patient	79 years of age
Parous	141 94 per cent
Nulliparous	9 6 per cent

Table II groups our cases according to the extent of the disease. It follows the classification of Schmitz and is of some interest for two reasons. First, because it shows the advanced type of case that comes to the Jefferson Clinic, there being only 16 in classes one and two (lesion limited to the cervix), an operability rate of 10.6 per cent and second, because the fact is obvious, that patients are not seeking advice at an earlier stage as the years go by. We have chosen the Schmitz classification because we believe it is more conducive to accurate com-

TABLE II.   EXTENT OF INVOLVEMENT, ALL CASES

YEAR	CLASS			
	1	2	3	4
1921-22	0	1	21	0
1922-23	1	4	13	1
1923-24	0	0	6	2
1924-25	0	0	9	3
1925-26	1	1	6	4
1926-27	0	0	8	6
1927-28	0	5	17	0
1928-29	0	2	17	2
1929-30	0	1	14	1
	—	—	—	—
	2	14	111	19
Operable		16	10.6 per cent	
Inoperable		130	86.6 per cent	
Recurrent or secondary		4	2.6 per cent	

parison than the terms early, borderline, and advanced. That the judgment of an individual case by different men of the same experience would differ is to be expected. Heyman's well-known example of this factor of personal equation need not be repeated.

Table III gives the present condition of every patient seen from 1921 to 1930. A source of much satisfaction is the success we have had in following up our cases. This follow-up was particularly difficult for the reasons that no systematic plan was adopted until 1927. Every patient has been examined personally by both of us except two; one patient is in England and one patient refused to return but the Social Service worker has paid her a visit. Of the treated patients, 95.7 per cent have been traced (94 per cent of the entire series). We have regarded all of the untraced patients, whether treated or not, as dead. There was one operative death in the entire series, 0.07 per cent.

TABLE III. PRESENT STATUS, ALL CASES, 1921-30

YEAR	PATIENTS SEEN	PATIENTS TREATED	LIVING	DEAD	UNTRACED
1921-22	23	23	1	21	1
1922-23	19	17	2	16	1
1923-24	8	6	1	7	0
1924-25	13	11	5	7	1
1925-26	12	10	1	8	3
1926-27	15	13	3	11	1
1927-28	22	22	8	12	2
1928-29	22	22	10	12	0
1929-30	16	16	9	7	0
	150	140	40	101	9

All patients traced		94.0 per cent
Treated patients traced		95.7 per cent
Primary mortality	1	0.07 per cent

ANALYSIS OF FIVE-YEAR CASES

At the beginning of our work in 1921 we had not come to the conclusion that irradiation with radium was the procedure of choice in every case. During the years 1921, 1922, and 1923, 4 patients were subjected to panhysterectomy, 3 of them having had preliminary irradiation with radium. Two of the patients operated upon died within one and one-half years; one patient received irradiation for recurrence at the end of six years, and died a year later. The fourth patient is living and well, having had a panhysterectomy in 1921 with irradiation for recurrence in 1925, followed subsequently by deep x-ray therapy. (See Table IV.)

Table VI summarizes the results obtained by irradiation. Of the small operable group, two are living and well, seven and eight years respectively. The third case was alive at five but died at seven years of recurrent carcinoma. These results represent a five-year curability

of 100 per cent and a present-day curability of 66.6 per cent. (The eight-year patient had a single radium treatment of 2,400 mg. hours; the living seven-year patient had two treatments, the first 1,200 mg. hours; the second 3,600 mg. hours [ten months later], and subsequent deep x-ray therapy; the patient dying after seven years had a single radium treatment of 3,000 mg. hours.)

Fifty out of 56 of the class three and four groups (inoperable) received radium treatment. Eight lived five years or longer, an absolute five-year cure of 14.2 per cent and a relative five-year cure of 16 per cent. Six of these patients are living and well at present, an absolute pres-

TABLE IV.   RESULTS, FIVE-YEAR CASES, HYSTERECTOMY AND IRRADIATION

CASES	FIVE-YEAR CURES	NOW LIVING	DEAD	UNTRACED
4	2—50 per cent	1—25 per cent	3	0

TABLE V.   EXTENT OF INVOLVEMENT, FIVE-YEAR CASES, IRRADIATION

YEAR	CLASS 1	CLASS 2	CLASS 3	CLASS 4
1921-22	0	1	21	0
1922-23	0	2	13	1
1923-24	0	0	6	2
1924-25	0	0	9	3
	0	3	49	6

One secondary case (prior hysterectomy elsewhere)
Operability   5.08 per cent

TABLE VI.   RESULTS, FIVE-YEAR CASES, IRRADIATION

	PATIENTS SEEN	PATIENTS TREATED	5-YEAR CURES	NOW LIVING	DEAD	UNTRACED
Operable 5.08 per cent	3	3	3 100 per cent	2 66.6 per cent	1	0
Inoperable 94.92 per cent	56	50	8 14.2 per cent (absolute) 16.0 per cent (relative)	6 10.7 per cent (absolute) 12.0 per cent (relative)	47	3
Total	59	53	11 18.6 per cent (absolute) 20.7 per cent (relative)	8 13.5 per cent (absolute) 15.0 per cent (relative)	48	3

ent-day cure of 10.7 per cent and a relative present-day cure of 12 per cent. (Four of the six living patients received single radium treatments of 2,400 mg. hours; one received 3,600 mg. hours; one received 3,000 mg. hours. Of the patients dying at the end of six years, one received a single 2,400 mg. hour treatment while the other had three treatments in all, 1,200, 500, and 200 mg. hours respectively.

The combined statistics of the operable and the inoperable groups present an absolute five-year curability of 18.6 per cent, with a relative five-year curability of 20.7 per cent. The present-day absolute curability is

13.5 per cent, and the present-day relative curability is 15 per cent.

There was no primary mortality in the five-year group. Of the treated inoperable cases half of the patients died within a year; 7 lived for two years, 3 for three years, and one for four years. About 25 per cent received more than one irradiation. We may point out as a matter of interest that taking into account all cases and all types of treatment, our absolute five-year curability rate is 20.6 per cent, with a relative rate of 22.8 per cent. Considering only patients living today, 14.2 per cent and 15.7 per cent respectively.

COMPARATIVE STATISTICS

Table VII is a grouping of results from various clinics recently published, selected because they admit of a uniform interpretation. All of the reports are in conformity with Ward's criteria.

TABLE VII. COMPARATIVE FIVE-YEAR STATISTICS, IRRADIATION

CLINIC	ALL CASES REPORTED	PERCENTAGE 5-YEAR CURES OF ALL CASES	PERCENTAGE OF OPERABLE CASES WITH PERCENTAGE OF 5-YEAR CURES OF THE SAME
Mayo (Bowing and Fricke)	1094	21.8	2.1 – 60.8
Radiumhemmet (Heyman)	790	20.6	25.5 – 40.4
Mercy Hospital (Schmitz-Hueper)	332	17.5	21.9 – 53.5
Womans Hospital (Ward)	259	24.3	25.9 – 57.1
Rhode Island Hospital (Pitts and Waterman)	92	17.4	20.6 – 57.9
Jefferson Hospital (The authors)	59	18.6	5.0 – 100.0

Several points must be clearly understood. Absolute five-year cures are based on all patients seen, whether treated or not. Relative five-year cures are based on the patients actually treated. Untraced patients are regarded as dead. Attention may be drawn to the fact that a five-year cure does not mean a permanent cure, and we would suggest that five-year statistics should include the percentage of all patients actually living at the time the report is made. (See Table VI.) Deaths occurring after the five-year period should be attributed to carcinoma unless proved otherwise. The question might also be raised whether recurrences under the five-year period, where reirradiation prolongs life beyond that limit, should be regarded as five-year "cures."

A variable factor is the "operability rate." Personal equation cannot be eliminated when the attempt is made to separate cases of cancer of the cervix into operable and inoperable groups. For example; in the report from the Mayo Clinic, and in our own report, the low percentage of operability means either that some borderline cases are excluded from the operable group (Class 1 and 2) or that the advanced

type of the disease is more frequently encountered. The more we restrict the limits of the operable group, the greater will be the proportion of cures in that group and vice versa.

Regarding the relative merits of irradiation and operation, Heyman's collected figures show a somewhat higher percentage of absolute cures for irradiation than for operation. It is to be remembered, also, that irradiation is elected in the more advanced cases and operation in the less advanced ones. When we limit our study to operable cases, irradiation has an advantage of nearly 5 per cent.

It is obviously unfair to compare the proportion of cures from irradiation or from operation in cases that are considered surgically operable, with the proportion of cures that is obtained from irradiation in cases of all types.

TECHNIC AND FOLLOW-UP METHODS

In the group of five-year cases analyzed, the average dose of radium was 2,400 mg. hours, employing capsules of the salt, screened with platinum, silver, or brass, enclosed within a tube of black rubber and placed within the cervical canal, or needles of Monel metal containing the salt plunged directly into the carcinomatous tissue. Gauze packing with plenty of vaseline was placed so as to protect the bladder and the rectum. In recent years, following the suggestion of Ward, a Pezzar catheter has been placed in the bladder. About 25 per cent of the treated cases were reirradiated with radium. Subsequently deep x-ray treatments were not used routinely, because some of the patients seemed to do badly as a result of it. Supplementary irradiation was used only in isolated instances as noted below. In succeeding years, the dose was increased to 3,600-4,500 mg. hours but more recently we have again returned to a smaller dose averaging 3,600 mg. hours. One factor influencing this return to a lower dosage was the occurrence of several fistulas that were probably the result of the larger dose. X-ray treatment has been given in a few cases that at the outset have shown such deep-seated involvement as to be beyond the influence of our radium technic. Arguments for the routine use of the x-ray as an adjunct in treatment seem to be sound ones, contrary to our experience in the past and this plan is favored in certain clinics. Healy has recently advocated x-ray exposures prior to radium application. Ward emphasizes his accomplishments with radium alone, but he also entertains hope for improvement in his results by the use of high-voltage rays in addition, and we are likewise considering this plan.

We agree with Ward as to the advisability of prompt reirradiation at the site of any recurrence. Patients are given regular appointments in the Follow-up Clinic, being seen personally by both of the authors, who have been especially engaged in this work. When a patient fails to keep in touch with the Clinic, the Social Service worker in

the department takes the matter in hand by letter or by personal call. One difficulty that we have encountered has been the frequent change in address of many of the patients. This is probably inevitable in any large city clinic. We have recently asked for the names and addresses of two or more relatives or friends of the patient at her first visit. This frequently facilitates our efforts to keep in touch with them. We regard as very important the personal observation of the patients by both of us as they return, and a persistent effort to have the patient come at regular intervals for examination.

PROGNOSIS FROM THE TYPE OF THE CANCER CELL

It is beyond the scope of this paper to include an analysis of the results obtained with irradiation in relation to the various grades of malignancy into which carcinomas of the cervix and other parts have been divided. We have only recently undertaken this part of the problem, but we hope to make a report upon it some time in the future. In the opinion of Dr. Baxter L. Crawford, Pathologist to the Jefferson Hospital, the gradation of tumors relative to their radiosensitivity has potential promise if one considers the histologic picture in close relationship with the history, gross type of lesion and its clinical course. We are at present employing a simple classification designated as low-grade, intermediate, and high-grade malignancy. This is more or less in accord with Healy's recently expressed summary of the opinion of numerous writers regarding the histology of their cervical cancer cases. It is of interest to note that some of our living patients show the so-called radioresistant type of lesion (low-grade malignancy type). We have not, however, progressed sufficiently with this study to present any definite conclusions.

SUMMARY AND CONCLUSIONS

1. We believe that the essentials suggested by Ward should be adopted as a basis for the standardization of irradiation statistics in carcinoma of the cervix.

2. The Schmitz classification of the extent of the involvement in cervical carcinoma, is in our opinion more desirable than the use of other forms in preparing a statistical review.

3. The number of operable cases, as seen in our Clinic, has not increased from year to year, a discouraging feature when the importance of early diagnosis is considered.

4. Our absolute five-year curability is 18.6 per cent, with a relative five-year curability of 20.7 per cent. The absolute present-day curability is 13.5 per cent and the relative present-day curability is 15 per cent.

5. Our five-year curability in operable cases is 100 per cent with a present-day curability of 66.6 per cent. In the inoperable cases the

absolute five-year curability is 14.2 per cent and the relative five-year curability is 16 per cent. The present-day curability in this group is 10.7 per cent (absolute) and 12 per cent (relative).

6. Our proportion of operable cases was 5.08 per cent.

7. There was no primary mortality in the five-year group.

8. Essentials in a successful follow-up of cancer cases are personal observation of the patients by selected members of the staff, and persistent efforts to have the patients return for examination at regular intervals.

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(For discussion, see page 322.)

269 S. Nineteenth Street,
Medical Arts Building.

Volpe, Amilcare: Hematocele From Non-Gravid Ovarian Hemorrhage.   Arch. ostet. e ginec. **16**: 1075, 1929.

The author illustrates a case of hematocele, originating from rupture of the menstrual corpus luteum, in which an extrauterine pregnancy was suspected.

The author sees the cause of the hemorrhage in certain alterations of the ovary and especially of its vessels.

Sydney S. Schochet.
Julius E. Lackner.

Volpe, Amilcare: The Process of Healing of Experimental Lesions of the Tube and of the Uterus. Arch. di ostet. e ginec. **16**: 933, 1929.

By means of experimental researches on animals the author shows that in the process of cicatrization of wounds of the uterus and tube, the muscular fibers regenerate in such a way as to reconstruct former integrity, however, only if no obstacle, even though aseptic, be present to interfere with this process.

Sydney S. Schochet.
Julius E. Lackner.

TUBERCULOSIS OF THE CORPUS UTERI WITHOUT INVOLVEMENT OF THE ENDOMETRIUM*

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THIS is the report of an unusual involvement of the uterus by tuberculosis, the process extending directly from the tubes to the myometrium with no apparent intervening involvement of the endometrium. It was an incidental finding in the Pathological Department and not responsible for the symptoms leading up to the patient's admission.

Before Hegar's monograph in 1886, tuberculosis of the genital organs was considered rare. Schlimpert in 3514 autopsies on females found gross tuberculous lesions in 61 per cent; of these 3.4 per cent involved the genital organs. It resolves itself with few exceptions into a study of tuberculous salpingitis. In a series of 200 cases at Johns Hopkins the tubes were affected in 99 per cent; the uterus in 72.6 per cent; ovaries in 33 per cent; cervix in 3.5 per cent; and the vagina in 0.5 per cent. In 68 per cent there was a coincident tuberculous peritonitis.

Genital tuberculosis is rarely primary, the source most commonly being a pulmonary localization. Involvement of the uterus is usually secondary by direct extension from the tubes; also by lymphatic spread from the tubes, or by the blood stream from any site. Involving the uterus this is one of the rare causes of chronic endometritis. The process usually begins as discrete tubercles in the interstitial tissue of the endometrium. These tend to coalesce and become caseous. The lesion is almost always sharply limited to the body, stopping at the internal os and not involving the cervix. With the endometritis there is often an extension into the muscle, a myometritis, the endometrium being destroyed at times, the menstrual function lost, and the uterine cavity filled with the thick, purulent, caseous fluid.

Just how the mode of spread in our case differed from this will be shown in the following report:

J. N., a thirty-nine-year-old, American negress, complaining of pain in the lower right quadrant, of two years' duration, was admitted to the Hospital March 14, 1929.

Menstruation began at the age of thirteen, occurred every twenty-eight days, and lasted for six days. Periods were more profuse in the last few years but there was no intermenstrual bleeding. There was dysmenorrhea beginning two days before the period and lasting throughout. Two pregnancies, one full term ten years ago, and one spontaneous miscarriage at two months, seven years ago.

Her usual weight was 207 pounds. There was no family history of tuberculosis or cancer. She was in good health until two years ago when she began to have a dull pain in the lower right quadrant. This was intermittent and worse during menstruation. About ten months ago she noticed a small, hard lump above the symphysis; this mass gradually increased in size until admission when she described it as being about the size of an orange. She had no symptoms referable to the lungs, heart, or bladder. Moderate constipation. No loss of weight.

Examination showed a well-developed, obese negress of thirty-nine years, not appearing ill. Head and neck negative; lungs clear; heart negative; abdomen obese. A firm, smooth, tender mass was palpable in the lower abdomen. Pelvic examination showed external genitals and vagina to be normal; cervix small, firm, and not lacerated. The uterus was enlarged to the size of a four months' pregnancy, firm, nodular, and slightly tender. The enlargement was more pronounced on the left side. There was some thickening felt in both adnexa.
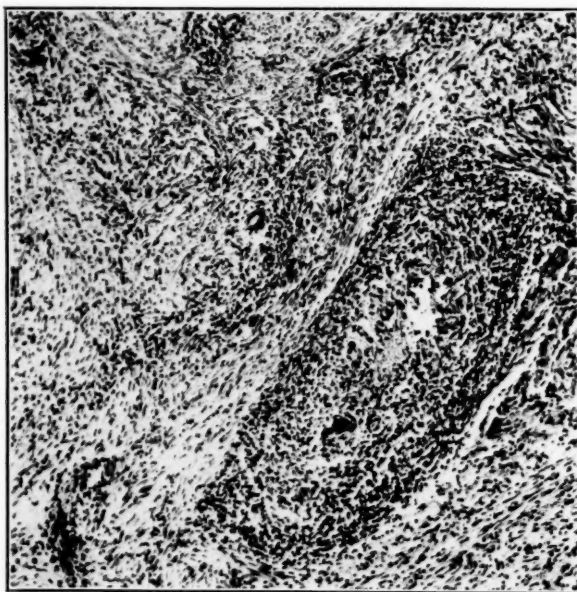

Fig. 1.—Low power photomicrograph showing a large tubercle in the myometrium.

Wassermann negative. R.B.C. 4,160,000; Hg. 60 per cent; W.B.C. 9,300; neutrophiles 72 per cent. Uranalysis showed a faint trace of albumin. X-ray of the chest revealed slight peribronchial thickening about the hila. There was no evidence of tuberculosis.

Diagnosis was made of fibromyomas of the uterus and chronic salpingitis. On March 15 she was operated upon. The uterus was found to contain several large fibroids; both tubes were enlarged, dilated, and club-shaped. Surface smooth except for dense adhesions. A loop of gut was adherent to the left broad ligament. Supravaginal hysterectomy and bilateral salpingo-oophorectomy were performed.

Pathologic Examination.—Uterus irregularly enlarged by several intramural fibroids. Both tubes were dilated and contained a yellowish viscid fluid. They were densely adherent to the ovaries posteriorly and beneath. The left ovary contained a corpus luteum cyst. Microscopic examination showed typical fibromyomas. The endometrium was moderately thickened. The glands were increased in number

and showed some irregularity in size and shape. They were lined by normal appearing columnar epithelium. The stroma appeared perfectly normal. Besides the fibromyoma the myometrium was found to contain numerous round, oval, or irregularly shaped masses which appeared as typical tubercles. In places these tubercles were discrete while in others they were coalescing. They were found in the outer two-thirds of the myometrium. Some of the sections are from blocks taken as far down in the body of the uterus as halfway between the cornu and internal os. In several sections tubercles were noted bulging into endothelial lined spaces which were possibly lymphatics. Section of the tubes showed a typical hydrosalpinx. Tubercles were found in the isthmic portion from both sides. None were found in the ovaries. The left ovary contained a corpus luteum cyst. Acid fast stain of sections failed to show the presence of tubercle bacilli.

Diagnosis.—Fibromyomas of the uterus; tuberculosis of the uterus; tuberculous salpingitis, nearly healed; glandular hyperplasia of the endometrium; and corpus luteum cyst of the left ovary.

Fig. 2.—High power photomicrograph showing a tubercle bulging into an endothelial-lined space.

The patient's postoperative course was uneventful and she was discharged from the hospital on the sixteenth day. Repeated examination in the follow-up clinic revealed no evidence of tuberculosis elsewhere in the body. She was last seen on October 16, 1929.

Several interesting points are illustrated by this case:

1. The unusual mode of extension of the tuberculous process from the tubes to the uterus, i.e., by the lymphatics to the myometrium, rather than by the usual path through the tubal lumen to the endometrium and thence to the myometrium.

2. The failure to establish a primary focus in the lungs or elsewhere.

3. The tendency to spontaneous cure in genital tuberculosis.

4. The often demonstrated fact that routine pathologic examination frequently brings to light unsuspected tuberculous lesions.

A NEW FORCEPS WITH A TRACTION CURVE*

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THIS instrument was designed by Dr. E. M. Hawks and myself as a simple, light, fixed axis-traction forceps. The blades are a modification of the Simpson type. They have the long cephalic curve with the tips lengthened, and an exaggerated curve of the posterior lips. The inner surfaces are beveled, simulating the cushion of the Kielland's. The shanks are a modification of those of the Piper instrument. They are bent downward at the middle but are shorter and have a sharper angle. The shanks are continued in the same plane with the blades as far as the bend. The curve in the shank is such that the plane of the handles and adjacent portion of the shanks, when the forceps are applied, is perpendicular to any plane of the pelvis in which the head may lie. (Figs. 1 and 2.)

The advantages of this instrument lie in the two features of prime importance in the forceps operation, viz., application and traction. The long, tapering, cephalic curve is well adapted to a moulded head. The blades fit evenly on the sides of the head with no pressure points and the tips may be anchored well below the malar eminences, thereby preventing slipping. The beveled inner surfaces minimize bruising and cutting of the baby's face and head. The exaggerated pelvic curve of the posterior lips of the blades permits extension over the perineum, with the least amount of pressure on the posterior vaginal walls and sulci. As the blades and adjacent portion of the shanks are in the same plane they are more elastic. This allows accommodation to heads of different sizes and shapes, with the least amount of compression. As a cephalic application is one of the essentials of the forceps operation, these forceps are preferably applicable only in anterior positions of the head. In other positions special types of forceps offer advantages which make them preferable. In posterior and transverse positions of the head in mid-pelvis, the single, accurate cephalic application and semi-axis traction pull with the Kielland forceps favor better results with less manipulation than are possible with manual rotation or with the Scanzoni maneuver. In certain cases, e.g., funnel pelvis or low pubic arch, after rotation has been accomplished, the traction curve forceps may be substituted to secure the advantage of the better pelvic curve,

and of the more pronounced axis-traction. When high forceps seem indicated, the same procedures may be used with one exception i.e., in a flat pelvis with the head in the transverse position and the posterior parietal bone presenting. Here the Barton forceps stand alone as the choice. After the asynclitism has been corrected and rotation completed, the traction curve forceps may be substituted, since the Barton
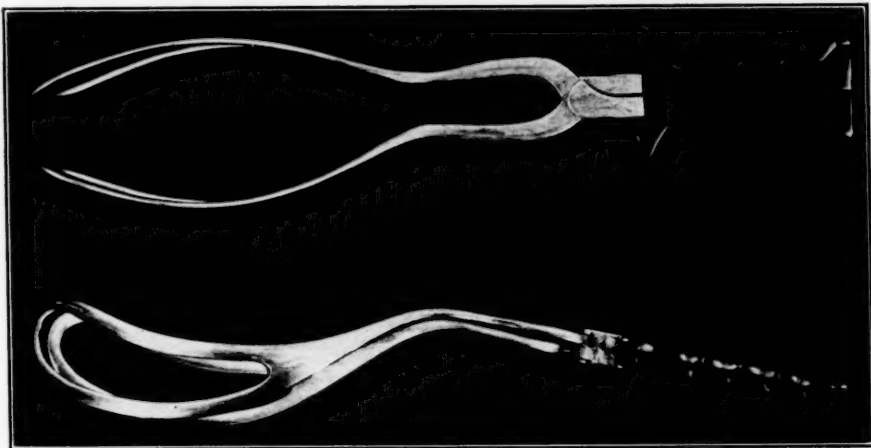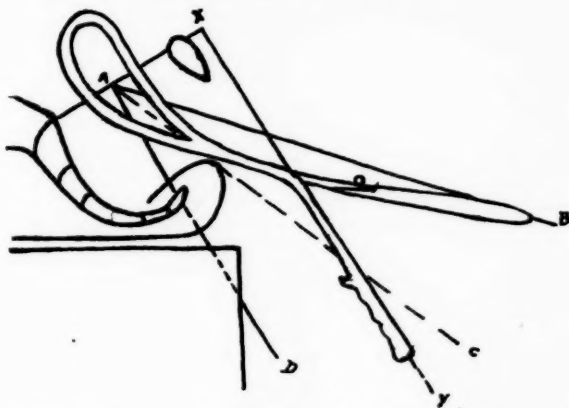

Fig. 1.—Traction curve forceps.

Fig. 2.—Line *AB* is direction of force applied to classical forceps. Line *XY* is the plane of handles of traction curve forceps, and is parallel to *AD*, the true axis-traction. Line *AC* is the resultant of force applied in the direction of *XY*.

forceps are not tractors. In some of the more difficult cases it may be wiser to use a heavier axis-traction instrument.

The backward bend of the handles and of the proximal portion of the shanks forms the traction curve, giving axis-traction in all cases. The principle of this curve is an old one. It was used by Morales and by Hubert about the middle of the nineteenth century, and by Galabin in 1877 under the name of a perineal curve. The importance of axis-traction should be emphasized. It determines effort and trauma. To use

the least force one must make traction in the pelvic axis. This is best accomplished in all stations of the head with some form of axis-traction forceps. Even in low forceps it is valuable in obtaining flexion, and in eliminating force wasted against the symphysis. Axis-traction suggests to many a difficult operation with a complicated instrument. For this reason, in the average case, it is often neglected though the advantages are admitted. The classical forceps without axis-traction are frequently used with the maximum force, modified by the Pajot maneuver. Axis-traction, however, automatically tends to keep the force in the plane of least resistance, thereby diminishing the amount of effort and injury.

The technic of application is similar to that of the classical type. Traction is made at the lock and finger guards. The handles rest in the palm of the hand with the middle finger in the space between the shanks. This avoids extra compression of the head from squeezing the handles together, since the principle of a third degree lever is used. Traction is made in the direction of the handles until the heels of the blades begin to distend the perineum. The handles are then slowly elevated with traction until the chin can be reached with the towelled fingers below the anus. Then the forceps are removed. It is true that there is some extra distension of the perineum in primiparae, due to the space between the shanks at the heels of the blades, as is the case with any Simpson type of forceps. This is not considered a disadvantage, as an episiotomy is generally done.

These forceps have been in use two and one-half years on more than 300 cases, of which 201, all that were done in one institution, have been tabulated. There were 26 operators of varying degrees of experience, from the junior intern to the obstetric surgeon. One hundred and sixty-five of the patients were primiparae, and 36 were multiparae. One hundred and twenty-nine were low forceps, and 72 were midforceps. There was no maternal mortality and only one baby was lost. This was an extreme case of asphyxia before the operation was started. Facial markings were extremely rare, and none of them were important. Repeatedly it was found that less effort was necessary for extraction with these traction curve forceps than with the non-axis-traction type by testing the pull of each on the same case.

SUMMARY

1. The instrument described is an uncomplicated, light, fixed axis-traction forceps.

2. It combines several desirable features in one instrument.

3. It is intended chiefly for use on heads in anterior positions.

4. It satisfies the requirements of correct application and traction.

5. Experience has shown that delivery in the average case is accomplished with less effort and with fewer injuries to mother and baby with this instrument than with other types of forceps.

133 EAST EIGHTIETH STREET.

A STUDY OF FIVE HUNDRED BLOOD TRANSFUSIONS

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THE popularization of bood transfusion in gynecology is of comparatively recent years. Previous to this time the measure was rarely employed, and then only in such cases as extreme anemia with continuous bleeding, and in emergency cases, such as ruptured ectopic gestation, postoperative hemorrhage, and those of incomplete abortion with hemorrhagic shock.

Since 1912, reports of the scientific work of the Woman's Hospital in the State of New York have been published in book form at various intervals. It is interesting to note that blood transfusion found no place in these reports until 1921, and since that time four papers in all have been published. Currier, in 1921, wrote briefly on blood transfusions in a general manner, and gave us an excellent bibliography of over ninety references. Ward, in 1925, emphasized the importance of prophylactic blood transfusions as a routine measure in poor operative risks. In the same year Souter and Duryen (thesis) studied posttransfusional reactions in a series of 190 cases; while Freeman and Vosburgh (thesis) noted the blood pressure changes in 250 cases. Farrar, in 1929, wrote on "Auto Blood Transfusion in Gynecology," described the technic, and rightly emphasized the importance of thorough training of the intern and nursing staff so that emergencies may be handled with ease.

The earliest record of blood transfusion in the Woman's Hospital dates back to 1917 when 2 were given, 1 for ruptured ectopic gestation, and 1 for a severe anemia in the course of a genitourinary infection. In the following year there were 4, 3 for ectopic pregnancy and 1 for a severe anemia. In 1909, transfusions were given to a patient with carcinoma of the cervix previous to radiation, 1 for postoperative sepsis, and 1 for postoperative surgical shock following a complete hysterectomy for chorioepithelioma. In 1920, a patient with ectopic pregnancy was transfused, while in the following year transfusions were not considered necessary. In these cases the amount of blood transfused averages 680 c.c. each. The method recorded in 6 cases was the indirect citrate technic, and while mention is not made of the others, it is reasonable to suppose that the same method was used.

In 1922, great stimulation must have been given to the value of blood transfusions, because in that year 20 patients received transfusions, and it was also in this same year (January 4) that the first

direct method was adopted. It is noteworthy that since that time only rarely have we resorted to the indirect method. In 1923 the number of transfusions increased to 70 and in 1924, to 108; following which well over 100 transfusions have been given yearly in this hospital. The value of such therapy by this time was thoroughly appreciated.

The present study deals with a series of 500 consecutive transfusions given to 382 patients. Two hundred and eighty-three patients received one transfusion; 83, two; 14, three; and 1 (chorioepithelioma), four; and another 1 (cancer of the cervix), five. From these figures it is at once apparent that there was no hesitancy to repeat transfusions; previous apprehension being overcome with increased care in typing.

Too much emphasis cannot be placed on the method of typing and cross typing. In this work the classification and hanging drop method of Moss was used. No patient should be transfused without the serum being cross matched with the donor's cells, and compatibility should not be handed down in less than thirty minutes. Too often we see agglutination of the cells after fifteen minutes or more. Rouleaux formation, while not an evidence of incompatibility, should always be regarded with suspicion, and I believe that it is safer to repeat the test. Such simple procedures call for no additional risk. When transfusions are to be repeated, fresh serum from the already transfused patient must be cross typed with the second donor's cells. It is best to do this even if the same donor is being used on two occasions.

It is interesting to note that our 382 patients do not correspond to the accepted percentages of blood type, these being 33 per cent of Type II, and 18 per cent of Type III. The others agreed with the standard. Three-fourths of our donors were of the universal type, which is easy to appreciate since 45 per cent of all people belong to Type IV, and furthermore because of the universal character of this class. We do not make any attempt to have donors of the same type as the patient.

Blood relatives were used in only one-fifth of our series and autotransfusion was done on 5 occasions. These do not include those cases reported by Farrar where the autotransfusion was given for the purpose of familiarizing the house staff with the technic.

The amount of blood given seems to be pretty well established at 500 c.c. Of course in cases of shock from severe hemorrhage one may require 750 c.c. or 1000 c.c. All our cases averaged 500 c.c. While less than this amount may stimulate the hematopoietic system equally well; yet the larger amount gives increased benefit without added danger. The influence on the hemoglobin and red blood cell count was studied by taking the blood count immediately before and forty-eight hours after the blood transfusion. Considering all cases to-

gether, regardless of etiology or complications, such as sepsis and the like, we found the hemoglobin was changed from 53.56 to 62.72, corresponding to the erythrocyte count of 3,295,000 and 3,736,000. To obtain a more accurate estimation we had a series of 261 cases where the red cell count was below 3,500,000 and without confusing factors, such as sepsis, bleeding, etc. Here we noted an improvement from 47.06 to 59.38 per cent, corresponding with 2,761,000 and 3,476,000. It is reasonable to believe that further destruction of the infused blood takes place after this period which might lower the calculated benefit somewhat; nevertheless, at this period stimulation of the blood-forming organs is taking place which would offset this added destruction of cells.

In studying the effect on the leucocyte count, it was found that the average count before transfusion was 10,178 and forty-eight hours later was reduced to 9,218. Where sepsis was one of the indications for this therapeutic measure, we found the values lowered from 15,185 to 13,188. If one judges the severity of the infection by the leucocytic estimation, and improvement with the fall of the count, it is reasonable to believe that transfusions are definitely of value here. I have in mind a study of the sedimentation time in such cases. Would it keep pace with the leucocytic count?

In addition to the cellular studies we made note of the temperature, pulse rate, and blood pressure changes occurring two hours and forty-eight hours after transfusion. The temperature curves do not seem to be of much value except when associated with chills. Estimation of the temperature changes was not reliable, as many of our patients were running a fever at the time of the transfusion, some were receiving milk injections, and there were many with a postoperative febrile reaction. Undoubtedly a rise of temperature does frequently occur, exclusive of chills, from the infusion per se; such cases are due to protein sensitization, an anaphylactic phenomenon, and have little or no effect on the picture itself.

Blood pressure changes in our cases were surprising. Considering all cases together we found that there was not any appreciable change in the blood pressure before transfusion as compared with that taken two hours and forty-eight hours after operation, either in the systolic or diastolic readings. Two sets of cases were isolated: in the first group, those with the systolic pressure between 100 and 130—no changes in either readings were observed; and in the second group, those with a systolic pressure of 150 or over, slight changes were noted, the systolic pressure averaging 164, 151, 150 and the diastolic 93, 87, 89. These figures represent the pressure immediately before, two hours after, and forty-eight hours after transfusion.

The pulse rate gave little information. Our figures show a slight

tendency toward lowering of the pulse as noted forty-eight hours after this procedure. No changes were observed in the two-hour interval.

Too often transfusions are given without sufficient indication—a last resort. They serve no useful purpose when given for postoperative shock where blood loss has not been a factor. Such patients will be much more benefited by a gum glucose infusion; especially is this so when the patient is still under the influence of the anesthetic. It is our belief that many lives have been saved by the use of gum glucose. It is of great value and indeed a life-saving measure if used while one is trying to obtain a donor. Canon claims much for this therapy. Blood transfusion on an unconscious patient is always better delayed until consciousness returns, because the patient is not able to give "the danger signal"—signs of incompatibility. We believe it is important to have a hypodermic needle loaded with adrenalin for use in such cases, should untoward symptoms arise. Ninety-nine patients may not need it; the hundredth may. Delay may prove fatal.

The etiology is noteworthy in passing. In a gynecologic hospital one would expect the leading diseases to be myomata uteri (42.2 per cent), incomplete abortion (12.6 per cent), carcinoma (12.4 per cent), hyperplasia of the endometrium (7 per cent), adnexal disease (6 per cent), and ectopic pregnancy (4 per cent). The frequency of other conditions need not be mentioned here.

The indications for transfusion may at first seem confusing with the etiology. Chief among these is anemia. An attempt has been made to divide the anemias into two sections, using as an arbitrary figure an erythrocytic count of 3,500,000. Below this value we considered that the transfusion was given for secondary anemia; whereas above this figure we termed it a "prophylactic blood transfusion" (Ward), attempting to improve the general condition, lessen the operative risk, and speed up recovery. Other indications are numerous; chief among them are: 1, hemorrhage—severe rapid bleeding from any source; 2, anemia of one grade or another with sepsis associated; 3, sepsis; 4, shock (traumatic). This latter indication is best treated with gum glucose; only exceptionally is transfusion indicated.

In the consideration of posttransfusional reactions one is ever mindful of the work of Jansky, Moss, Lewisohn, and Unger in their attempt to eliminate such phenomena. I agree with Drinker, McClure, Dunn, and Sydenstricker that regardless of how carefully the testing may be done, reactions do occur. I have in mind a study of the clotting and bleeding time in relation to transfusions, since it is possible that alterations are produced in this direction which may be responsible for some of the reactions. Drinker and Brittingham brought out this idea. The experimental work of Guthrie and Huch in determining the presence of additional isoagglutinins and isohemolysins in

the blood show the necessity of using fresh serum after each transfusion for cross matching with the donor's cells. Lindeman's contention that such phenomena are due to hemolysis cannot always be proved.

The possibility of changes in the protein plasma by its contact with glassware, rubber tubing, and metal, as a cause of reactions has never been proved. Some claim that fresh rubber tubing is prone to produce reactions, and believe that it should be boiled once or twice before using it. Others believe that larger needles and tubing are to be preferred, on the strength that an apparatus with a small lumen leads to crushing of the cellular elements which in turn promotes reaction. Anaphylactic shock certainly explains some reactions, as many such cases are relieved by the injection of adrenalin or epinephrin. Whether we should study them from the standpoint of immunology is not certain.

In this clinic our reactions are divided into two divisions: a) immediate, occurring within six hours, and, b) delayed, occurring from six to forty-eight hours after the transfusion. Of course reactions do occur later on; such, however, are rare and, in our experience, unimportant. These divisions are subdivided into three classes: 1, single reactions; 2, multiple reactions; 3, thrombophlebitis.

In 500 transfusions there were 270 without any reaction whatsoever. On first examination this seems a relatively small number, but consideration of the single reactions improves the outlook.

Single reactions occurred in 137 patients. Too much importance should not be accredited to them, as many of them would have occurred regardless of the transfusion. Fifty patients complained of headaches of various grades of severity, occurring as frequently in the immediate as in the delayed stage. Twenty-five suffered from immediate chills of an average duration of sixteen and a half minutes, while delayed chills occurred in only 4 cases but were of longer duration—twenty-nine minutes. Chilliness, as opposed to definite chills, is almost as common. Perspiration, nausea and vomiting, and restlessness are infrequent; and, in our patients, diarrhea, urticaria, epigastric distress, backache, and edema of the face were rare symptoms.

Table I shows the incidence of multiple reactions occurring in either period, each case presenting a combination of two or more reactions of which there were one hundred and eighty-two among 72 patients. The average duration of the chills was sixteen and six-tenths minutes in the immediate stage and of twenty-nine minutes in the delayed period. Even multiple reactions must not be overemphasized; rather the operator must stress the significance of intratransfusional reactions which represent immediate incompatibilities. The significance of this factor will be discussed later.

TABLE I. MULTIPLE REACTIONS

TYPE	IMMEDIATE	DELAYED
Headaches	28	26
Chills	27	6
Perspiration	22	11
Chilliness	16	10
Nausea and vomiting	7	7
Restlessness	3	7
Backache	1	8
Diarrhea	0	4
Urticaria	2	1
Edema of lids or face	3	0
Epigastric distress	1	1
Air embolism	1	0

Table II gives percentages to show where possible causes of reactions lie. As one might expect, blood relation plays little part in this connection, which is in contrast to some of the theories expounded in the German literature. It is noteworthy that more multiple reactions occurred with the Scannell apparatus than with the Unger. In our hospital we are using at the present time the Unger needles with the Scannell machine, as we prefer this type of needle. Perhaps the increased reactions with this machine are due to the fact that blood is infused more rapidly with it than with the other, in which case it cannot be blamed. In our hands, the Scannell apparatus is a simpler one, more readily set into working order, and certainly much easier cleaned.

Whether the donor is of the same type as the recipient is in our experience unimportant, notwithstanding that many institutions use donors only of the same type as the recipient. From analysis of our statistics it is apparent that a universal donor does not increase the number of reactions.

Ottenberg, Kaliski, and Freedman were the first to show that where multiple transfusions were given, the recipient developed specific agglutinins and hemolysins against the donor's cells. That immune hemolysins and isoagglutinins are more likely to develop with repeated transfusions is shown by Ottenberg and Libman. Our statistics show that no added danger is encountered when blood transfusions are repeated.

We make it a rule, in so far as possible, to have both the donor and the recipient abstain from food and fluids, except water, for at least three hours before the transfusion. The few cases presented in which this rule could not be carried out show the tendency to increase reactions. There is need for the study of such allergy; the biochemist should help us here.

The place of gum glucose when given before transfusion in relation to the reaction is unimportant. Probably it has nothing to do with such phenomenon. Forty-two of our patients received an average of 325 c.c. of gum glucose before transfusion.

TABLE II. REACTIONS AFTER TRANSFUSIONS

ANALYSIS IN PER CENT	DONOR		METHOD		TYPE		PREVIOUS TRANSFUSIONS			RELATION TO MEALS	GUM GLUCOSE	HEART AFFECTION
	Relative	Professional	Unger	Scannell	Same	Universal	0	I	II	Less than 3 hr.	Before	
Total cases (500) 100%*	20.2	78.8	70.2	28.8	70.4	28.6	77.0	19.6	3.0	5.6	8.4	20.4
	Read across for comparison and down to total											
Reaction None 54%	50.5	54.6	55.0	50.7	54.0	53.8	52.8	55.1	81.0	46.4	69.0	53.9
Single 27.4%	30.7	27.4	28.8	25.0	27.2	28.0	28.5	25.5	13.0	46.4	2.4	30.4
Multiple 14.4%	16.0	14.2	11.7	21.5	14.0	15.4	14.8	13.3	6.0	7.2	16.7	13.7
Thrombophlebitis 1%	2.0	0.8	1.4	0.0	0.8	1.4	1.0	1.0	0.0	0.0	2.4	1.0
Others including one death 3.6%	0.8	3.0	3.1	2.8	4.0	1.4	2.9	5.1	0.0	0.0	9.5	1.0
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*The five autotransfusions run in by gravity account for the discrepancy of 1 per cent in adding the totals of the first line. The two instances where the patient had three and four previous transfusions, respectively, are not included in order to simplify the table.

It is not within the sphere of this paper to discuss transfusion in relation to cardiac disease. Most of our patients with cardiac affection had simply a murmur at the apex or base, occasionally slight enlargement, rarely signs of decompensation. Such patients all stand transfusion well. However, when severe cardiac disease is present, it is wise to consult the internist before giving the transfusion.

Four patients developed thrombophlebitis; in 3 it occurred after operation, and in the other case sepsis was present. Summarizing these cases in general, as a detailed description is not pertinent, we note:

1. The ages of 3 were between twenty-five and thirty, the other one was thirty-nine years old.

2. Blood relative donors were used in 2 cases.

3. Unger method adopted in all.

4. Donors all of the same type as the recipient except in 1 instance.

5. One patient with sepsis (pelvic abscess) received two transfusions, developing phlebitis in the right leg after the first and in the left leg after the second transfusion. (No operation.)

6. One patient had preexisting cardiac affection without decompensation.

7. The phlebitis developed from seven to twenty-one days after transfusion. the average being ten.

8. In the 3 operative cases the complication developed from ten to fifteen days after operation. The average being twelve.

9. It seems hardly reasonable to credit such cases of thrombophlebitis to the transfusion. Nevertheless, it must be considered as a possible or predisposing factor.

There were 13 cases where the course of the transfusion could not be followed because death intervened. All were extreme cases where transfusion was given as a last resort and not on a real scientific basis; one had two transfusions, the first being of the auto type. All were suffering from a terminal peritonitis except for 3 cases of surgical shock and 2 from postoperative internal hemorrhage which did not respond to the transfusion.

In 500 transfusions 1 death occurred which we believe was the direct result of the transfusion. It was in a patient forty-three years of age who entered the hospital with an erythrocyte count of 3,000,000 and a hemoglobin of 45 per cent. The patient was a Type III and was given transfusion of 700 c.c. of blood from a universal professional donor which led to an improvement of the red blood cells to 3,500,000 and hemoglobin to 53. Thirteen days later a supravaginal hysterectomy and bilateral salpingo-öophorectomy was performed. At the conclusion of the operation the condition was fair. Nevertheless, it was felt that a transfusion would increase the resistance and hasten convalescence. Although the patient was still under the influence of the anesthetic a transfusion was begun. Near the conclusion of the transfusion slight stertorous breathing was noted, but apparently the

intern did not recognize its importance and continued the transfusion, at the termination of which the pulse suddenly became imperceptible, respirations were slow and stertorous, there was air hunger and the blood pressure was too low to record. Adrenalin was administered without effect and the patient expired. The second donor was a nephew of the Type III group. Autopsy revealed: "pulmonary embolism, atelectasis of the lungs, and fatty degeneration of the liver." This calamity emphasizes: 1, the importance of delaying transfusions until the patient is conscious; 2, the value of gum glucose until consciousness returns or a donor is obtained, and 3, the necessity of interpreting the meaning of intratransfusional reactions. It might have been avoided. One in 500 is only 0.2 per cent, nevertheless it is too often.

CONCLUSIONS

1. Blood transfusion is a safe procedure and only in recent years has it been fully appreciated.

2. When transfusions are to be repeated, it is of the utmost importance to use fresh serum from the already transfused patient for purposes of cross matching with the succeeding donors' cells.

3. Gum glucose infusions are of great value while waiting for consciousness to return or until a donor is obtained, and are more useful than blood transfusions in cases of shock where hemorrhage has not been a factor.

4. Posttransfusional reactions are still to be fully explained, and most important of all are the intratransfusional reactions which are the danger signals and signs of incompatibility.

5. Transfusions may be repeated with safety.

6. While thrombophlebitis occurred in 1 per cent of our cases, it is doubtful whether or not transfusion played any part in its development.

7. The one death might have been avoided if the operator had interrupted the transfusion when the first signs of incompatibility appeared.

614 BIRKS BUILDING.

FATAL UREMIA DUE TO COMPLETE PROLAPSE OF THE UTERUS

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FRORIEP, in 1824, noted damage to the urinary tract due to prolapse of the uterus. He ascribed the dilatation of the ureter to the pressure of the cystocele and to kinking of the urethra.

Virchow, in 1846, described an autopsy on a woman forty-three years old, who died with peritonitic symptoms, following an irreducible prolapse. The lower portions of the ureters were found contracted, the upper dilated. According to Virchow, the condition resulted from prolapse of the trigonum.

Halban and Tandler, in 1907, noted dilatation of the ureter in 15 of 23 cases of prolapse. They believed that the cystocele produced a constriction at the hiatus genitalis and thus compressed the ureters.

Mirabeau, in 1908, briefly recorded that he found dilated kidney pelves in 3 cases of uterine prolapse, in 3 cases of cystocele without prolapse, and in 5 cases of prolapse of the anterior vaginal wall without cystocele.

Hirokowa, in 1911, reported the findings in 2 autopsies. In the first case in which death was due to pneumonia, the ureters were dilated, the dilatation being most prominent at the crossing of the common iliac vessels. The caliber near the kidney and below the uterine vessels was normal. In the second case a nulliparous woman of seventy came to autopsy, death being due to widespread carcinoma of the breast. The left ureter and kidney pelvis were dilated, the maximum dilatation again being found at the crossing of the iliac vessels on the left side, the right ureter being less dilated. This author believes the compression due to the force exerted by the cystocele, especially that part below the hiatus genitalis. He explains the mechanism as due to pressure of the intraabdominal bladder segment as well as the herniated portion of the bladder in the everted segment of the vagina.

Dilatation of the ureter during pregnancy has been frequently observed and has been ascribed to the increased intraabdominal pressure. (Latzko and Schiffmann.)

Brettauer and Rubin demonstrated dilatation of the ureter by means of pyelograms in patients presenting themselves for operation. They examined eleven women and found hydro-ureter in eight.

In spite of the apparent frequency of ureteral dilatation, serious symptoms ascribable to this cause have but rarely been reported. In a search of the literature I have been able to find a fatal outcome in only two cases, in one of which symptoms were first noted after operation, in the other no history is available.

Sellheim, in 1913, illustrated a condition (his Fig. 10) in which a woman fifty-two years old, para iv, died as the result of an ascending pyelonephritis. According to his interpretation, dissection shows obstruction due to a ureteral kink at the site of entrance into the prolapsed bladder. This figure, however, does not clearly show the site of narrowing.

Young, in 1924, reported the case of a woman, aged fifty-two, who suffered from prolapse after the birth of her first child. She was operated upon for the descensus, but after fifteen years, during which time she had 3 more children, she had an

irreducible prolapse. The specific gravity of the urine was found to be 1.008. There was a trace of albumin. Young performed a plastic operation, the patient dying three days after operation, with suppression of urine. At autopsy the kidneys were found to be small with bilateral hydronephrosis. ''The ureters were slightly distended.''

I am able to report the following case through the courtesy of Dr. J. Wolff, ophthalmologist to Mt. Sinai Hospital, Dr. G. Baehr, physician to Mt. Sinai Hospital, and Dr. Paul Klemperer, pathologist to Mt. Sinai Hospital.
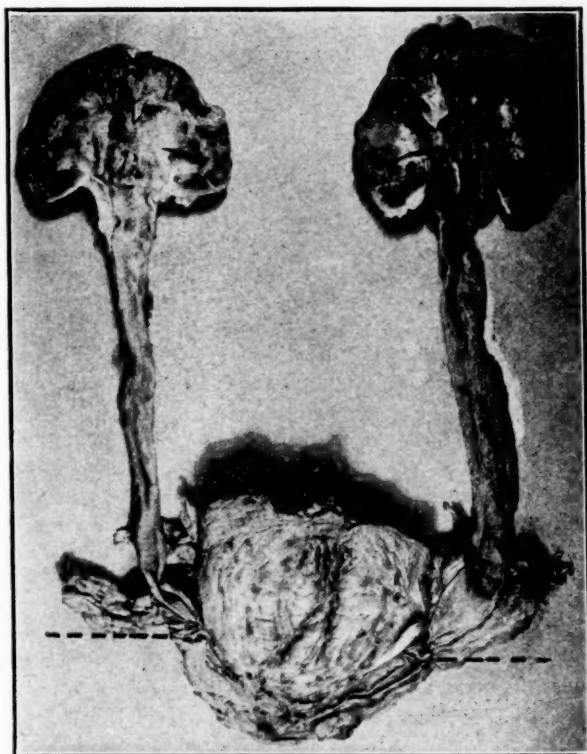

Fig. 1.—Showing the pyonephrotic kidneys and greatly dilated ureters. Below is the bladder laid open. The broken lines indicate the uterine arteries crossing the ureters. Below this level the ureters are normal in caliber.

Mrs. K. R. (Hospital No. 311,745), aged sixty-four, was readmitted to Mt. Sinai Hospital for extraction of cataract of the left eye, for which five weeks previously a preliminary iridectomy had been performed. This patient previously had been suffering from vomiting spells for several years, for which no cause had been found.

Menopause had occurred sixteen years before, and since then a complete reducible prolapse of the uterus existed.

General examination showed unimportant findings except for cataract of the left eye, slight arteriosclerosis, complete prolapse of the uterus with some superficial ulceration of the cervix, and varicose ulcer of the left leg. On February 27, 1930 an extraction of the lens was performed under local anesthesia. From that time on, persistent vomiting occurred.

In spite of appropriate medical measures, uremia developed. On March 9, ten days after operation, anuria set in. The blood urea was 205 mg. to the 100 c.c. The patient died March 18 in spite of all efforts to combat the uremia.

At autopsy, the findings resulting from chronic and acute uremia were noted. Of interest in the present connection was a complete prolapse of the uterus, bilateral pyonephrosis and extreme bilateral hydronephrosis, and dilatation of the ureters. The ureters were tremendously dilated from the kidney down to the point of crossing of the uterine arteries, below which the caliber of the ureters was approximately normal. (Fig. 1.)

The demarcation line between upper dilated ureteral segments and lower undilated portions was so clean cut and sharp that it seemed clear that the tension and compression exerted by the uterine vessels caused the stasis. From the advanced kidney changes noted, it appeared unlikely that reposition of the prolapse would have altered the outcome.

It is surprising, considering the frequency with which ureteral dilatation and kidney damage result from prolapse of the uterus, that serious postoperative consequences are not more frequently observed. It is our present practice to examine the kidney function of every case of prolapse and large cystocele as a routine, by means of the phenol-sulphonephthalein and urine concentration tests with the hope of avoiding operation on patients whose kidney function has been too greatly impaired. Our results from this investigation will be reported later.

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10 EAST EIGHTY-FIFTH STREET.

THYROTOXICOSIS COMPLICATED BY PREGNANCY*

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BASEDOW'S disease complicated by pregnancy was studied by George Gray Ward in 1909, by Novak in 1912, Beck in the same year, and Seitz in 1913, and many more recent workers. Naturally the point of interest for the obstetrician is what method of treatment should be pursued to the best interests of his patient.

The case which I present to you for discussion is one of thyrotoxicosis complicated by pregnancy. Not infrequently there is developed a thyrotoxicosis during a pregnancy. This form of hyperthyroidism may be entirely secondary to the pregnancy or a latent case of Graves' disease suddenly become activated by the pregnancy.

Mrs. J. M., aged twenty-seven, came to me on August 27, 1930, with a history of amenorrhea for the past six months, and complained of extreme nervousness, sleeplessness, loss of weight, dyspnea, and palpitation. Menstruation began at the age of sixteen, at which time the patient remembers the appearance of a definite enlargement of her neck. The periods were regularly established from the onset, coming every twenty-eight days, and lasting from one to two days with a moderate amount of flow. Her last regular period began on the seventh of January, 1930. Date of expectancy was therefore October 14, 1930. She was a gravida 2, para ii. Her first pregnancy, consummated on June 26, 1926, was marked by the same group of symptoms that she now complained of, in fact the patient thinks they were more severe. This previous pregnancy was followed by a three-day labor, failure of the head to engage, and termination by cesarean section. Her previous medical history, aside from the thyroid disease, and surgical history, was essentially negative. There is no familial history relating to thyroid disease. This is noted in view of the fact, that it is not uncommon for Basedowian mothers to give birth to children who develop exophthalmic goiter.

Physical examination revealed an acutely ill female, short in stature, weighing 110 pounds, with marked exophthalmos and anxious appearance. Von Graeffe and Moebius signs were positive. The teeth were badly decayed. The thyroid gland was markedly enlarged, especially so the isthmus. The lungs were negative, the pulse was 160, a functional systolic murmur was heard at the left base with no apparent cardiac enlargement. The fundus of the uterus was enlarged to the size of a seven months' gravidity, but the fetal heart could not be obtained because of the rapid maternal pulse, although fetal movements and parts were definitely elicited. Aside from the presence of a gravid uterus no further findings were obtained by vaginal examination. The pelvis was of the simple-flat type with a true conjugate of 8 cm. The blood pressure continually remained between 130/70 and 140/80, the urine was normal. Although for the remaining period of her gestation up to the time of her delivery she was continually kept at rest in bed and under the influence of luminal and codeine in combined doses, she nevertheless lost considerable weight, 22 pounds in one month,

notwithstanding a diet rich in carbohydrates and fats with little or no protein content. The latter was excluded because of its specific dynamic action in raising the basal metabolic rate.

This progression of unfavorable symptoms, the marked tachycardia, increasing dyspnea, and loss of weight prompted me to terminate this pregnancy at eight and one-half months' gestation by laparotrachelotomy. Sterilization was accomplished by enucleating the tubes from the cornua of the uterus. Spinal anesthesia preceded by sodium amytal, morphine, and scopolamine, was used. She was continually kept under the influence of morphine and codeine, and received frequent administrations of intravenous glucose for the first four days postoperative. The pulse gradually diminished to a rate of 120, at which point it remained. The dyspnea disappeared, and the patient made an uneventful recovery.

On October 24 she still presented the picture of an active Basedow's disease, although her exophthalmos was not as marked as when I first saw her. The pulse was 120 in rate, but the irritability, anxiety, and palpitation still remained. The basal metabolism before operation was plus 80. Basal metabolism postoperative, was not obtained because of the patient's refusal to submit to the procedure. Four and one-half pounds of the 22 pounds which she had lost, have been regained.

It is perfectly evident that this patient dates back her history of thyroid disease to her beginning puberty. This Basedowian syndrome, already established in her childhood, but in a very mild form, became activated to an alarming degree during her first venture in motherhood. In pregnancy it is not uncommon to find a group of mild symptoms due to an overactive thyroid in the first four or five months. This is a result of the increased demands of pregnancy on the thyroid in the early months; and until the thyroid becomes accustomed to these increased demands, there exists disturbances in its function which are expressed in the hyperirritability, enlarged thyroid, and tachycardia. The basal metabolism may show no change or a slight rise in its rate. Where this apparently benign symptom complex takes on serious proportions, a basal metabolic rate of plus 40 is not uncommon. The rule is for these symptoms to subside and the basal metabolic rate to diminish after the first semester. Beck believes that patients with Graves' disease, whose thyroids have already been functioning excessively before conception occurred, improved subjectively during pregnancy. This he attributes to the absence of the menstrual cycle which in the nonpregnant state is one of the main causes of increased disturbance. It is his opinion that thyroidectomy should be done in the early months of pregnancy only, if symptoms progressively and alarmingly increase. All other cases should be treated medically, subjective improvement occurring after the fifth month, with an uncomplicated labor at term. In 260 cases of Graves' disease complicated by pregnancy, he was compelled to do thyroidectomy only five times, and in no case did he find it necessary to interrupt pregnancy.

In 112 cases of Graves' disease complicated by pregnancy, Seitz found the manifestations of hyperthyroidism were not affected in 40 per cent

of cases. A very small number improved during pregnancy. About 60 per cent were made distinctly worse by gestation. In about one-quarter of this 60 per cent group serious danger to the health and life of the patient ensued. In this group of 112 cases there were 7 deaths, 5 therapeutic abortions, the induction of premature labor in 11 cases, and thyroidectomy performed during pregnancy in 7 cases. Three cases miscarried, 3 gave birth to macerated fetuses, and 3 had premature births. He ascribes the intrauterine death and maceration to toxic influences. He does not consider medicinal or x-ray treatment effective. In the early part of pregnancy he advises dietetic and hygienic measures. Only, if in the later months of pregnancy the subjective and the objective symptoms grow progressively worse, does he admit of an indication to interrupt pregnancy. Together with Ward, Hammerschlag, Riessmann, and Gellhorn, he believes the least dangerous form of intervention to be vaginal section under spinal anesthesia, after the patient had been prepared with scopolamine and morphine; this to the exclusion of bagging, bougie, etc. He advises against marriage, citing the case of the exophthalmic mother having three daughters with Graves' disease. If married, he advises against conception; and if gravid, vaginal section with sterilization.

My own feeling as to the type of section leans rather to the laparotrachelotomy as devised by Krönig and modified by Beck. The rapidity with which this operation can be done under spinal anesthesia is a distinct advantage, thus reducing the time element, enhancing the control of hemorrhage, and substituting a simple operation for one which is not free of technical difficulties and impractical in contracted pelvis.

CONCLUSIONS

1. The essential factors in the antepartum care of a pregnant woman suffering from Graves' disease are:

(a) Absolute rest, with the use of sedatives if necessary.
(b) Improvement of hygienic conditions.
(c) Dietetic correction excluding as much as possible the intake of proteins because of their high specific dynamic action.

2. Where labor is spontaneous, it is advisable to shorten the second stage by the use of forceps.

3. Where it becomes necessary to terminate pregnancy as an emergency measure, the best procedure is laparotrachelotomy under spinal anesthesia, preceded by morphine and scopolamine.

4. Cases of hyperthyroidism which are so severe as to require emergency measures should also be sterilized.

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2021 GRAND CONCOURSE.

THE DIFFERENTIAL DIAGNOSIS OF ACUTE INITIAL SALPINGITIS AND APPENDICITIS BY MEANS OF A MENSTRUAL SIGN

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DESPITE the various signs and symptom-sequences that have been suggested as means of differentiation between acute appendicitis and acute right-sided initial gonorrheal salpingitis, the problem still presents sufficient difficulties to account for a diagnostic error in an appreciable number of cases, an error justifiable perhaps, in view of the particular similarity of the symptomatic picture and the spacial proximity of these two organs. The tubal entity under consideration has been designated acute initial salpingitis advisedly, in contradistinction to the acute recrudescences of old inflammatory processes. For it is only in the initial (right-sided) lesions where there has been no palpable tubal enlargement that difficulties of differentiation usually occur. I dismiss from consideration the numerous clear-cut cases where an accentuated symptomatology prevails and renders the diagnosis obvious; nor is it deemed justifiable to consider acute appendicitis in any differential quandary involving pyosalpinx, a tuboovarian abscess, or a rare ectopic; because these entities present tangible physical evidence of the existing pathology under an anesthesia, if not otherwise. And, finally, one can eliminate instances where positive gonorrheal smears from the cervical discharge are sufficiently conclusive and convincing.

In support of this view on differential error, I quote from Polak,[1] who tellingly expressed his opinion in terms of percentages. He stated: "It is sometimes difficult to differentiate right-sided tubal inflammation from appendicitis, for abdominal operation has shown that appendectomy has been performed in 10 to 15 per cent of cases where tubal disease is the existing pathology." And he cautioned that the margin of error would be reduced to a minimum if proper credence be given to a well-taken history, to properly observed physical signs, and to a careful consideration of their sequence. The most striking and convincing proof of the existence of this diagnostic failure has been recently substantiated by Farr and Findlay[2] in their

absorbing analytical disquisition based on over 500 patients with salpingitis who were operated upon at the New York Hospital. In this large series, 103 cases were erroneously diagnosed, and of these fully one-half, or 53 to be exact, were mistaken for appendicitis. Because of this pronounced percentage of error these authors have devised a differential formula wherein, by substituting known facts and values, an accurate diagnosis may be arrived at. But it must be remembered that though such a schema is available and of value, it is not to be too rigidly adhered to, for the misinterpretation of a symptom, undue appreciation of another, and a lack of consideration of others may cause the whole delicate fabric to crumble, and lead one far from the paths of diagnostic truths.

Of the many diagnostic methods advocated as pathognomonic of these two lesions that we need to take seriously, the majority depend on a particular physical sign, on the blood findings, and on the order of appearances of the various symptoms. In brief:

1. The late Dr. Murphy's[3] symptom-sequence: "In appendicitis, there is an acute abdominal pain, most frequently referred to the region of the umbilicus or epigastrium, followed by vomiting, the vomiting consisting of the contents of the stomach. This in turn is followed by local pain, in the region of the appendix, and a slight rise in temperature and pulse."

2. Primrose[4]: "In appendicitis, the maximum point of tenderness is situated at the junction of the upper and middle third of a line drawn from the umbilicus to the right anterior-superior spine. In salpingitis, the point of hyperaesthesia is at the junction of the lowest and adjacent fourth of a line drawn from the middle of Poupart's ligament to the umbilicus."

3. Morris[5]: "Hypersensitiveness on deep pressure at a point about one inch and one-half to the right of the navel indicates appendiceal involvement, whereas increased sensitiveness both to the right and left of the navel point to the pelvis for the source of infection."

4. Hammond[6]: "In appendicitis, accentuated tenderness appears over McBurney's and Morris' point; in salpingitis, the most exquisite tenderness is elicited by pressure over Poupart's ligament."

5. Fischer[7]: "In infections of the tube, the point of greatest sensitiveness lies usually below the interspinal line." And he does not state definitely where the sensitive area is, in appendicitis.

6. Berthomier[8] quoted by Fischer: "Examination in the left lateral position produces severe pain over McBurney's point in appendicitis, while in salpingitis, McBurney's point is free from pain with the lateral position maintained."

7. Iliescu[9]: "In appendicitis, there is a very painful point on the right side of the neck, located in the middle of the triangle formed by the two heads of the sternomastoid muscle and the clavicle, corresponding to the site of the phrenic nerve. This sign is absent in right-sided salpingitis."

8. Hinkleman[10]: The count of an uncomplicated case of appendicitis is that of a polynuclear leucocytosis with a marked reduction of the normal number of lymphocytes. The count in tubo-ovarian lesions is distinctly that of an absolute leucocytosis with both eosinophiles and small leucocytes above the normal number."

Valuable as these methods have proved, their universal application has not availed in the occasional case. Methods which depend on

circumscribed points of hypersensitiveness and on the presence of localized pain on palpation, present their shortcomings, particularly when there is a generalized area of abdominal rigidity. Under these circumstances, these points or areas readily overlap, and, although the localization of Primrose's, Morris', and Hammond's points is certain, their value is doubtful. Iliescu, aware of this undependability, tried to surmount the difficulty by seeking for a more accurate differential sign elsewhere than the enigmatical abdomen. His search led him far afield; and he was able to observe a tender spot on the right side of the neck in cases of appendicitis. But even this aid (according to his notation) melted away with the application of an ice-bag over the appendicular region. Notoriously noncommittal is the leucocytic reaction for differential purposes, since both lesions come within the range of the lowest to the highest counts; and leucocellular gradations depend not on the source of the infection, but on the severity of the bacterial toxicity and the leucocytogenic resistance. Hinkleman's further emphasis of the eosinophilic and basophilic increase and diminution above and below the absolute number is no more enlightening, and not always convincing. The symptom-sequence of the late Dr. Murphy, which he formulated from the study of 2000 cases of appendicitis, is of decided value as a diagnostic adjuvant in the majority of instances; yet it is not the symptomatic response of the atypical cases, and, moreover, it is the actual sequential manifestation of an all-too-frequent right-sided tubal inflammation.

For diagnostic purposes, it can safely be assumed that during an *initial acute attack,* never are both organs simultaneously at fault. The infection is always primary in one of the two structures to the total exclusion of the other. Obviously, a vigorous inflammatory process, given sufficient time, may extend beyond its point of origin, and involve surrounding structures. An acute endosalpingitis, with pus exuding from the tubal ostium may attack a juxtaposed appendix, but the extent of the involvement is limited to the appendicular peritoneum, or the serosa, producing a perityphlitis, and, as such, the appendiceal process remains as harmless as the concomitant perisigmoiditis or perienteritis which occurs in all the more aggressive and prolonged inflammatory tubal lesions. Conversely, an inflamed pelvic appendix may produce a peri-adnexitis, an adhesive reaction with cellular infiltrations of the outer coat; but it never involves the salpingeal mucosa to the extent of a pyosalpinx or a tubo-ovarian abscess. On the other hand, the ravages of a ruptured pelvic appendix are decidedly menacing and compromising. With reference to the combined morbid involvement, Child, in 1919,[11] reported an absorbing statistical study, based on 746 cases of adnexal diseases from the records of the City Hospital, in 339 of which the appendix was removed and examined. In this series, the appendix was found micro-

scopically normal in 99 cases and pathologic in 240; it appeared in the pelvis in 75 instances, and, of these, 25 were acutely involved, while 37 showed subacute and chronic lesions. Unfortunately, the author does not state the exact nature of the structural morbidity, whether an actual threatening mucosal appendicitis or a surgically inconsequential perityphlitis.

The collocation of gonorrheal organisms in the endocervix does not necessarily initiate a bacterial ascension of the intrapelvic genital tract. Unlike Bartholin's and Skene's glands, which yield to these germs without a struggle, the healthy endocervix maintains a stout resistance in an effort to attenuate their virulence, stay their course, and destroy them outright. Only in the presence of excessive venery, alcohol, trauma, or debility, in a woman with a supervening menstrual flow, does the ascent begin. In support of this view is a recent report by Kidd[12] of London, wherein he states that out of 142 carefully treated and subsequently observed cases of cervical gonorrhea, only 11 developed adnexal involvement. The gonococcus reaches the endosalpinx either in an attenuated form, exhausted by the cervical encounter, or, it may pass the arbor vitae unscathed. In the former case, there occurs a low grade salpingitis, bereft of initial symptoms save some vague pelvic ache; in the latter, there develops an attack of acute lower abdominal pain with rigidity, temperature, and leucocytosis. But, in both instances, there invariably occurs some derangement in the menstrual cycle, slight and disregarded, or definite and pronounced, depending on the virulence of the toxicant and the severity of the reaction. I hypothesize, therefore, that the presence of the gonorrheal organisms beyond the internal os, strewn over the endometrium and the endosalpinx, upsets the normal harmonic mechanism which controls the occurrence and individualistic regularity of the catamenia. • On this factor is based the pathognomonic differentiation between the two lesions, the absence in acute appendicitis, and the presence in acute salpingitis of a disturbed menses. This disturbance, concerned with the time of occurrence, the amount of flow, and the presence of pain, is limited to the last menstrual period preceding or concomitant with the attack of lower abdominal rigidity and tenderness. Pointed questions, and these need be definite, probing, specific, rather than vague, casual and perfunctory, and oftentimes even astute when dealing with a patient who is endeavoring to conceal an indiscreet act —will reveal that the period (in question) was either delayed or occurred sooner than the expected date; that there was either a menorrhagia or an oligomenorrhea; it extended over a longer or shorter period of time; or, that there developed either a premenstrual, comenstrual, or a postmenstrual pain, differing in nature from that of a preexisting, if existing, idiopathic dysmenorrhea. Either one or more of these primary types of disorders invariably precede any acute

initial attack of a salpingeal origin; while in an acute appendix, be it pelvic or an abdominal organ, the catamenia maintains an individualistic norm.

The application of this diagnostic aid necessitates a careful investigation of the patient's previous menstrual history, and a knowledge of what is the normal sequence of events in each particular case. In the occasional instance when the menses are so thoroughly irregular with respect to time of occurrence, amount, and nature of flow, this method of differentiation does not avail. Nor is it applicable in cases of pregnancy, nor in patients past the menopause.

The necessity for an immediate accurate diagnosis between acute appendicitis and acute salpingitis is obviously of extreme consequence when it is realized that the treatment for one condition is antagonistic to that of the other. Whereas acute appendicular lesions demand immediate surgical intervention, operation is categorically contraindicated in the acute tubal processes, the nongynecologic surgeon to the contrary, notwithstanding.

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Abscesses of the uterus are not very common. The author describes a case which he feels to be very unusual, because of the enormous amount of pus, about 5 liters, and because of the very rapid and full restitution of the organ. Aside from this perfect regeneration of the uterus in regard to shape, volume, and consistency, it is noteworthy that it also returned to its normal static relations in the pelvis.

The author has doubts as to the etiologic factor, but in this instance might be ascribed to the suppuration of an intramural myofibroma.

SYDNEY S. SCHOCHET.
JULIUS E. LACKNER.

THE POSITION OF THE UTERUS BASED ON A STUDY OF SPINAL-PELVIC RELATIONSHIP*

A Study of 500 Cases

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WHILE the human spine has been studied roentgenologically to determine the presence of any anomaly, injury or disease, the paucity of the literature on any study of the relation of the spine to the pelvis from a gynecologic and obstetric point of view is the reason for presenting the results of this study.

The attention of the profession has been called to the different anatomic types among the human race by a number of writers who treated this subject from their own specialistic viewpoint, but a gynecologic and obstetric study of the varied anatomic types has not been reported. This study aims to establish what may be considered the normal relation between the spine and the pelvis, to note the prevalence of any particular variation from the normal, also to observe the position of the uterus in the standard normal type and to compare this with the position of the uterus in the patients who have a variation in the relation of the pelvis with the spine.

Once the attention is called to the existence of varied anatomic types, one can readily observe, in his immediate surroundings, persons who are tall, others who are short; some who are stout and others who are thin. These different individuals have no doubt developed under some varied physiologic influences. A study of the peculiarities of each type may lead to a better understanding of them. The difficulty in these studies, however, is to establish what characteristics shall constitute an individual of the normal type. Once the normal is established, then persons having similar abnormalities may be classed as belonging to a common type. From a gynecologic viewpoint the so-called "abnormalities" will really not be considered as abnormalities, but as normal characteristics of a special type. According to Sturmdorf there are several types of women whom he classified by the consideration of their posture based on the measurement of the depth of the lumbosacral curve, as belonging to the normal, to the exaggerated type or to the infantile flat type.

Cushway and Maier reporting the results of their examination of 931 male spines, state "each spine is characteristic of the individual and he may be identified by a roentgenogram of the spine just as definitely as by a photograph of the face or by

fingerprints.'' They report 510 cases with congenital developmental defects, the greatest number occurring in the lumbosacral region, probably due to the fact that this is the last part of the neural arch to close. Just as the individual vertebra may show abnormalities in development, the spine as a whole has been shown to vary with different individuals. The number of presacral vertebrae have been shown to vary, although the human spine usually conforms to a modal type in the majority of cases. Willis says that it is important to note that in spite of a phylogenetic ancestral tendency toward a greater number of thoracic and lumbar segments, man has succeeded in attaining a reduction of the vertebra to a model number of 17 presacral vertebra in 95.8 per cent of the cases he examined.

The human vertebrae according to Goldthwait have peculiar characteristics which he identifies as coming from a ''slender anatomic type'' or from a ''heavy anatomic type.'' He describes not only the peculiarities of these vertebrae but also calls attention to the relation of the sacrum to the crests of the iliac bones of these two types. The vertebrae of the ''slender anatomic type'' have a narrow lateral width and are thicker in the long or vertical axis. The transverse processes are long and slender. The ribs of these individuals are long and slender, having a tendency toward displacement of the diaphragm, forcing the viscera downward, especially if the patient is in the upright position. The sacrum of this type is placed high in relation to the crests, with the appearance of an apparent increase in length of the spinal column. The vertebrae of the ''heavy anatomic type'' possess a greater lateral width with a lessened thickness of the bodies in the vertical axis. The transverse processes are short and strong. The spines are strongly formed, the tips are broad and override the process below. These processes may be in such close contact that very slight backward bending is possible. The articular processes are crescenting, with vertical axes, allowing very little lateral bending of the body. The last ribs in these cases are either long or short but are horizontal and are heavy in structure. The sacrum in this type is wider and is placed low between the iliac crests. The spinal column is not shorter but the apparent shortness is due to the fact that the last lumbar vertebra is entirely below the level of the considered normal.

Patterson in writing on the human sacrum states that ''the surface for articulation with the ilium may be shifted forward, but is more frequently shifted backward.'' This confirms Goldthwait's observation and one may assume that the lumbosacral articulation will be shifted, depending upon the position of the sacroiliac articulation. Such changing in the position of the lumbosacral articulation influences the lumbar curve in the spine. In the normal spine the sacrum articulates with the last lumbar vertebra and with the iliac bones so that the upper surface (superior articular process) presents an inclination of about 45 degrees with the vertical. Supporting the torso, head and extremities, the centrum of the last lumbar vertebra rests upon the sloping surface from which it is separated by the interposed fibrous disc. The inferior articular processes of the last lumbar vertebra hook over the superior articular processes of the sacrum and prevent this vertebra and superimposed spine from slipping downward and forward from the articulating inclined plane of the sacrum. If any developmental defect or any defect caused by injury exists in these inferior articulating processes displacement may occur.

Von Lackum in an anatomic study of the lumbosacral region and Hibbs and Swift in a study of the abnormalities of the lumbosacral juncture call attention to a method of determining the lumbosacral angle. This measurement, while it may be obtained by measuring the skeleton, cannot be used clinically. From these studies however we know that the lumbosacral angle varies with the individual and is not only dependent upon the articulation of the last lumbar vertebra with the sacrum but that it is influenced by the tilt of the pelvis, which is the result of the position that the sacrum maintains in relation to the iliac bones. Since the degree

of the lumbosacral angle may be affected by the presence of congenital defects in the vertebrae, by severe muscle strain that is always present in this region and by spinal injury, and since the measurement suggested by von Lackum can only be made on the skeleton, for clinical purposes, it is necessary to have a measurement which, while it is not mathematically perfect, will nevertheless be sufficient to give a clue as to the anatomic type to which the individual belongs.

Since the same factors which influence the formation of the lumbosacral angle also influence the creation of the lumbosacral hollow Sturmdorf suggested that a measurement of the depth of the lumbosacral hollow may be a guide in determining the spinal-pelvic relationship.   The present study aims to determine whether the measurement of the lumbosacral hollow showed the existence of any definite spinal-pelvic relationship also whether the spinal-pelvic relationship had any influence on uterine position.
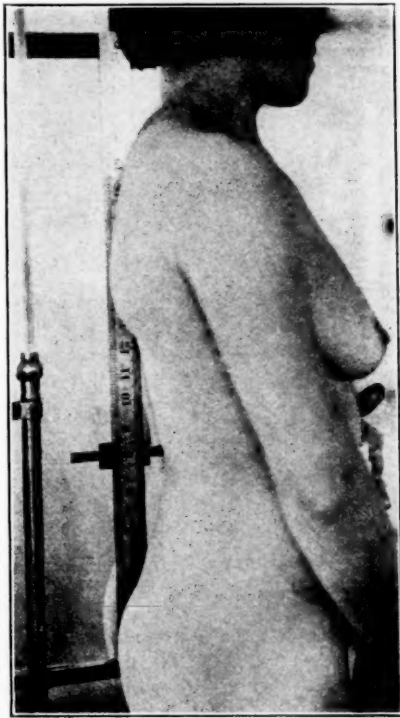
Fig. 1.

In order to take this measurement I devised an instrument which is constructed on the principle suggested by Sturmdorf when he first described the lumbosacral index. This instrument makes the elucidation of this index simpler and obviates some of the shortcomings in the use of the ordinary rules held in position by the hand. It is made up of two metal rules, one 10 cm. long placed at right angles to the second rule which is 60 cm. long. The long rule is fixed perpendicularly on the height measuring rod of a scale. On the long rule there is a sliding device which carries in it the smaller rule in a horizontal position. By a thumb screw adjustment the sliding device with the

horizontal rule may be placed at any height on the perpendicular rule. Before the thumb screw is firmly tightened the horizontal rule can be pushed forward into the depth of the lumbosacral hollow. When the thumb screw is tightened, the two rules are locked in position. To obtain the measurement, the patient stands on the scale in her natural attitude, in her stocking feet, and her back uncovered. The anterior edge of the vertical rule is in contact with the most prominent spinous processes in the dorsal and sacral regions. The reading is taken at

Fig. 2.

the point on the anterior border of the perpendicular rule where it is crossed by the upper border of the horizontal rule on the level of the deepest part of the intervening hollow. The horizontal reading denotes the depth of the lumbosacral curve. The perpendicular reading denotes the height at which the lumbosacral measurement was taken. In addition to measuring the lumbosacral curve, the height, weight, and pelvic measurements were recorded in this large number of cases. A gynecologic examination was also made to determine the position of the uterus, the condition of the adnexa and the pelvic floor.

In this series we have white and colored patients. Some are tall

and thin or tall and stout; others are short and thin or short and
stout. In each group we have women who correspond to the "slender
anatomic type" or to the "heavy anatomic type" of Goldthwait.
These groups respectively correspond to the "infantile" and to the
"exaggerated" types described by Sturmdorf. In the "infantile"
(slender anatomic) type, the axis of the pelvic inlet is in such rela-
tion with the horizon that it forms an angle of about 75 degrees. The
pelvis is rotated downward and backward. The measurement of the
lumbosacral curve is about 30 mm. or less. In the "exaggerated"
(heavy anatomic) type, the pelvis is in relation with the horizon so
that the axis of the inlet forms an angle with the horizon of about

Fig. 3.

35 degrees. The pelvis is rotated downward and forward and the
lumbosacral curve measurement is high, about 45 mm. or more.

Just as the position of the pelvis varied in the several types, the
uterus was found to maintain a position, in a large number of cases,
that corresponded to each type. In the "slender anatomic type" the
uterus was found to be retroverted, while in the "heavy anatomic
type" the uterus was retrocessed. In the so-called "normal" type,
the pelvis being balanced in equilibrium, the uterus was found in the
anterior position. The measurement of the depth of the lumbosacral
curve in this type is between 30 and 40 mm. In spite of the fact
that these types are easily recognized one must bear in mind that
each type may have a number of cases that may present a variation

in the position of the uterus. These cases, small as they may be in number, would be considered as the abnormal ones of the type under consideration. In other words, there may be an acquired malposition in the slender anatomic type or in the heavy anatomic type. These cases would bear the same relation to the "abnormal type" as do the abnormally placed uteri that are seen in patients whose spinal-pelvic relation is normal and in whom one would expect to find the uteri in the anterior position.

That spinal-pelvic relation (pelvic tilt), intraabdominal pressure, and integrity of the pelvic floor are factors closely associated in influenc-

Fig. 4.

ing uterine position, one would expect that the different anatomic types would show a uterine position peculiar to each type. When the force of intraabdominal pressure is exerted in a downward direction, the reaction or angle of deflection will vary in the different anatomic types because of the difference in the pelvic tilt with the associated deflecting areas at the brim of the pelvis peculiar to each type. Sturmdorf aptly explains the action of intraabdominal pressure in these cases by utilizing the law of dynamics—which is, that the direction of a given force or body impelled by such a force, impinging against a given plane, becomes deflected in a fixed and definite manner; the degree of deflection being governed by the angle of the

resisting plane. The difference in the deflecting areas at the brim of pelvis (symphysis) in these types can readily be appreciated by examining the patients vaginally in the erect posture.

Retrodisplacement of the uterus following a pelvic floor injury may be easily differentiated from congenital retrodisplacement by utilizing the measurement of the depth of the lumbosacral hollow. Many of the cases in this series that had retrodisplacement were nullipara with no pelvic floor injury. These patients possessed a stature which placed them in the type or class that is expected to have uterine displacement.
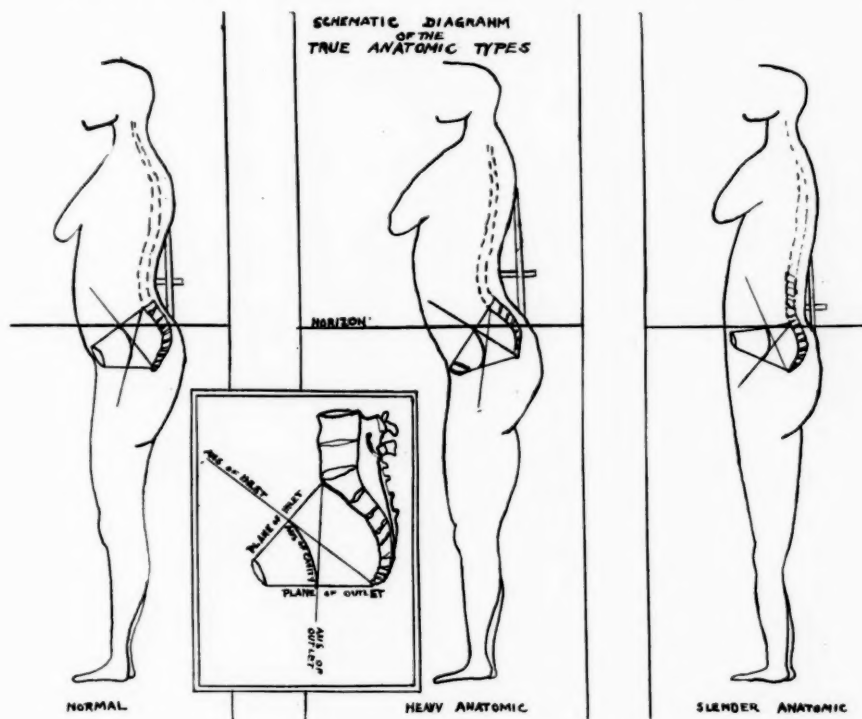
Fig. 5.

In the general conception of a normally placed uterus the fundus is directed upward and forward and the cervix points downward and backward. The uterus lies in the direction of the axis of the pelvic inlet. It is interesting to read in some textbooks on gynecology, the description of the several positions of the uterus that do not coincide with the "accepted normal standard." The authors describe symptoms that are supposed to exist with each variation in position. Much space is devoted to the etiology and methods of cure. These writings lead to confusion not only of the undergraduate but also the practitioner. In view of many opinions that malpositions per se are symptomless, that if symptoms are present they are due to concomitant disease in the cervix or of the adnexa, it would be much simpler to

consider the subject of uterine position in its relation to the posture of the individual; the posture being dependent upon the lumbosacral relation or pelvic tilt.

In pursuing the study on this basis three positions of the uterus were named: anterior, retrocessed, and retroverted.

1. The anterior position, when the anterior surface of the uterus faces forward and the uterus is placed in the pelvis anteriorly to the axis of the pelvic inlet, and is a short distance from the symphysis pubes.

2. The retrocessed position, when the anterior surface of the uterus faces forward, but the entire uterus including the cervix is placed a varying distance posteriorly to the axis of the pelvic inlet; and the uterus is nearer to the sacrum.

3. The retroverted position, when the anterior surface of the uterus faces upward and the body of the uterus is tilted backward, cervix pointing forward (a) first degree of retroversion; or the anterior surface of the uterus is turned completely backward so that the examining finger in the vagina can easily feel the posterior surface of the uterus (b) second degree of retroversion; or complete retroversion when the fundus is down in the culdesac and the cervix points up to the symphysis (c) third degree of retroversion. These retroverted positions may be congenital or acquired. The latter type is usually in women who have had a pelvic floor injury which causes an interference with the deflection of intraabdominal pressure.

Under the term of congenital retrodisplacement are included the retrocessed or retroposed uterus and the retroverted uterus. In the latter type are also included those cases that have a congenitally long cervix which favors retroversion. The retrocessed uterus was found in women of the "heavy anatomic type." This type has a deep lumbar curve. The sacrum forms an inclined roof from which the uterus is suspended by short sacro-uterine ligaments, placing the uterus higher up in the pelvis or further back toward the sacrum. The vagina in many of these cases is long. The congenitally retroverted uterus is usually present in nullipara or in multipara of the "slender anatomic type." In this type the entire pelvis is rotated downward and backward. After a pregnancy is completed in patients of this type, the uterus will resume the position of retroversion in spite of the fact that pessaries are used with the hope of preventing retroversion from taking place.

The exposition which follows rests on a study of 500 cases with the previously described instrument. The number of cases studied was 542 but it was decided to exclude all cases of patients who had a previous laparotomy for gynecologic disease or those patients who had repair on the cervix or perineum on the assumption that any of these operations might influence the uterine position. The report is therefore on 500 patients who have not had any previous operation. In studying this problem it was interesting to see how a number of similar cases grouped themselves into certain definite types. Allowance was made for the occasional cases that had a slight deviation, therefore some comment about the tables and their numerical values will not be amiss.

TABLE I. SHOWING TYPES OF PELVES

TYPES	WHITE		COLORED	
TRUE		Per cent		Per cent
I. Uterus, anterior position, index medium	102	29.48	31	20.13
II. Uterus, retrocessed, index high	85	24.56	46	29.87
III. Uterus, retroverted, index low	50	14.45	18	16.69
SUBTYPES				
(a) Uterus, anterior position, index low	12	3.47	3	1.95
(b) Uterus, anterior position, index high	23	6.65	25	16.23
(c) Uterus, retrocessed position, index low	20	5.78	3	1.95
(d) Uterus, retrocessed position, index medium	22	6.36	4	2.60
(e) Acquired retroversion	32	9.25	24	15.58
	346		154	
Total, True Type, Percentage		68.49		61.68
Total, Subtype, Percentage		31.51		38.28

TABLE II. OBSTETRIC ANALYSIS OF THE TRUE TYPES, WHITE

	NUMBER OF CASES	PREG-NANCIES	TYPE OF DELIVERY		
			SPONTA-NEOUS	INSTRU-MENTAL	CESAREAN
I. Uterus, anterior	36	0			
Index medium	25	1	25		
	4	1		4	
	14	2	28		
	4	2		8	
	7	3	21		
	1	3	2	1	
	1	3	1	2	
	3	4	12		
	2	6	12		
	1	7	7		
	4	1			4
Total	102		109	15	4
II. Uterus, retrocessed					
Index high	43	0			
	9	1	18		
	3	1		3	
	8	2	16		
	2	2	2	2	
	1	3	3		
	1	3	2	1	
	3	4	12		
	1	4	3	1	
	1	5	5		
	1	6	5	1	
	1	6		6	
	1	12	11	1	
Total	85		77	15	1
III. Uterus, retroverted					
Index low	24	0			
	10	1	10		
	4	1		4	
	7	2	14		
	2	2	2	2	
	2	3	6		
	1	3	1	2	
Total	50		33	8	

1. They have been obtained by close personal study made upon individuals in a penal institution, upon patients in private practice and upon patients in a public hospital.

2. That patients of the white and colored races were studied and while the two races cannot be compared, each race has types that may be similarly grouped.

3. These measurements furnish approximate figures that suggest the type, even though a closer study of the individual may show that some variation may be present which may place such an individual into one of the subgroups. Kretschmer in reporting a study on the "Nature of Constitution and Theory of Temperament" states: "The

TABLE III. OBSTETRIC ANALYSIS OF THE SUBTYPES, WHITE

	NUMBER OF CASES	PREG- NANCIES	TYPE OF DELIVERY		
			SPONTA- NEOUS	INSTRU- MENTAL	CESAREAN
a. Uterus, anterior position Index low	6	0			
	3	1	3		
	1	1		1	
	1	1	1		
	1	4	2	2	
Total	12		6	3	
b. Uterus, anterior position Index high	12	0			
	2	1	2		
	2	2	4		
	2	3	6		
	1	4	4		
	1	9	9		
	1	10	10		
	2	1			2
Total	23		35		2
c. Uterus, retrocessed Index low	10	0			
	6	1	6		
	2	2	4		
	1	3	3		
	1	4	4		
Total	20		17		
d. Uterus, retrocessed Index medium	13	0			
	3	1	3		
	3	2	6		
	1	2	1	1	
	1	3	3		
	1	6	6		
Total	22		19	1	

e. Acquired retroversion:
    1. Cases resulting from previous pregnancies
        9 had high index
        17 had medium index
    2. Cases caused by pathology in adnexa
        4 had high index
        2 had medium index
Total   32

figures may be regarded only as a provisionary halting place but not as statistical constant.'' The figures in this study should be similarly regarded.

4. Many cases may be found and used as examples against the establishment of the three types. It should be borne in mind, however, that as the result of hereditary or atavistic influences these cases may present mixed characteristics thus accounting for the slight variation from the standard types.

The question which presents itself is—Are the statistical frequencies in this large series of cases, showing types of patients with a certain spinal-pelvic relation and a corresponding uterine position,

TABLE IV. OBSTETRIC ANALYSIS OF THE TRUE TYPES, COLORED

	NUMBER OF CASES	PREGNANCIES	TYPE OF DELIVERY	
			SPONTANEOUS	INSTRUMENTAL
I. Uterus, anterior	11	0		
Index medium	12	1	12	
	6	2	12	
	1	4	4	
	1	5	5	
Total	31		35	
II. Uterus, retrocessed	25	0		
Index high	2	1		2
	6	1	6	
	1	2	2	
	5	3	15	
	3	4	12	
	2	5	10	
	1	6	6	
	1	9	8	1
Total	46		59	3
III. Uterus, retroverted	12	0		
Index low	5	5	25	
	1	3	3	
Total	18		28	

of sufficient number to justify the establishing of the three types previously described? With these facts stated we may approach these figures with an open mind so as to enable us to weigh the pros and cons of the results of the study of the problem that is being presented.

Of the 500 cases studied, 346 were white and 154 were colored.

In this series of cases, patients who belong to the ''true retroversion'' type had been operated upon to correct the position, with a recurrence in each instance. The patients also stated that they suffered more after the operation for a varying period.

There are also a number of cases in this group that have been informed that because of the ''tipped womb,'' they need not expect ever to become pregnant. These patients later became pregnant and delivered, some spontaneously and some needed instrumental aid. On

the follow-up, these patients showed a return of the retroversion. These patients never complained of anything before or after the delivery. They only became aware of the presence of a "tipped womb" because the physicians apprised them of that fact when they were consulted for sterility.

A study was also made of the height and weight of the patients of both races, to note whether these factors had any obstetric influence.

TABLE V.   OBSTETRIC ANALYSIS OF THE SUBTYPES, COLORED

	NUMBER OF CASES	PREGNANCIES	TYPE OF DELIVERY	
			SPONTANEOUS	INSTRUMENTAL
a. Uterus, anterior Index low	3	0		
Total	3			
b. Uterus, anterior Index high	13	0		
	6	1		
	3	2	6	
	1	8	6	
	1	9	8	
	1	1	9	1
Total	25		29	1
c. Uterus, retrocessed Index low	1	0		
	1	1	1	
	1	2	2	
Total	3		3	
d. Uterus, retrocessed Index medium	2	0		
	1	1	1	
	1	2	2	
Total	4		3	
e. Acquired retroversion: 1. Index medium	Pathology in Adnexa			
	5	0		
	Resulting from previous pregnancies			
	2	1	2	
	1	3	3	
	1	8	7	1
2. Index high	Pathology in Adnexa			
	9	0		
	Resulting from previous pregnancies			
	3	1	3	
	1	2	2	
	1	3	3	
	1	4	4	
Total	24		24	1

Any height up to 5 feet 2 inches was classed as short; all heights above 5 feet 2 inches as tall. The weight schedule that was followed is the "Average Table of the Weights of Adults." A few pounds variation from the scheduled weight corresponding to the height was allowed in a number of instances. The pelvic measurements were also noted in all cases and the pelves were designated as small or normal using the accepted measurements as a basis for comparison.

Having thus established that there are different types of women and having shown that these types present a definite position of the uterus peculiar to each type, and that any variation in position of the

TABLE VI

WHITE	A (Tall and normal weight)	B (Tall and thin)	C (Tall and stout)	D (Short and normal weight)	E (Short and thin)	F (Short and stout)	Total no. of cases	Cases without pregnancy	Cases with pregnancy	Total no. of pregnancies	Pelvis N.	Pelvis S.	Spont.	Inst.	Ces.	Instr. A	Instr. B	Instr. C	Instr. D	Instr. E	Instr. F	Ces. A	Ces. B	Ces. C	Ces. D	Ces. E	Ces. F
True Types																											
Uterus, anterior Index medium	17	5	15	33	7	25	102	36	66	123	90	12	106	13	4	1	—	2	6	—	4	—	1	—	2	—	1
Uterus, retrocessed Index high	9	3	27	9	7	30	85	43	42	93	75	10	83	9	1	—	—	4	—	—	5	—	—	—	—	—	1
Uterus, retroverted Index low	8	4	10	16	4	8	50	24	26	46	44	6	39	7	—	—	1	3	2	1	—	—	—	—	—	—	—
Subtypes																											
Uterus, anterior Index high	4	2	6	7	1	3	23	12	11	37	19	4	35	—	2	—	—	—	—	—	—	—	—	—	1	—	1
Uterus, anterior Index low	—	1	—	5	2	4	12	6	6	10	11	1	7	3	—	—	—	—	1	—	2	—	—	—	—	—	—
Uterus, retrocessed Index low	6	3	2	6	2	1	20	10	10	17	18	2	17	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Uterus, retrocessed Index medium	4	1	6	4	2	5	22	13	9	19	19	3	18	1	—	1	—	—	—	—	—	—	—	—	—	—	—
Uterus, retroverted Index variable (Acquired)	1	5	4	8	2	12	32	6	26	49	29	3	44	5	—	—	—	—	2	—	3	—	—	—	—	—	—
Total	49	24	70	88	27	88	346	150	196	394	305	41	349	38	7	2	1	9	11	1	14	—	1	—	3	—	3

TABLE VII

COLORED	True Types / Subtypes	A — TALL AND NORMAL WEIGHT	B — TALL AND THIN	C — TALL AND STOUT	D — SHORT AND NORMAL WEIGHT	E — SHORT AND THIN	F — SHORT AND STOUT	TOTAL NO. OF CASES	CASES WITHOUT PREGNANCY	CASES WITH PREGNANCY	TOTAL NO. OF PREGNANCIES	TYPE OF PELVIS N.	TYPE OF PELVIS S.	TYPE OF DELIVERY SPONT.	TYPE OF DELIVERY INST.	TYPE OF DELIVERY CES.	INST. A	INST. B	INST. C	INST. D	INST. E	INST. F	CES. A	CES. B	CES. C	CES. D	CES. E	CES. F
	True Types																											
	Uterus, anterior / Index medium	4	6	5	6	7	3	31	10	21	32	27	4	32	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Uterus, retrocessed / Index high	15	4	12	8	3	4	46	25	21	62	35	11	59	3	—	1	—	—	1	1	—	—	—	—	—	—	—
	Uterus, retroverted / Index low	5	4	1	3	3	2	18	12	6	8	15	3	6	2	—	1	1	—	—	—	1	—	—	—	—	—	—
	Subtypes																											
	Uterus, anterior / Index high	2	3	7	2	4	7	25	13	12	30	18	7	29	1	—	—	—	—	—	—	1	—	—	—	—	—	—
	Uterus, retrocessed / Index medium	—	—	4	—	—	—	4	2	2	3	4	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Uterus, retrocessed / Index low	—	—	3	—	—	—	3	1	2	3	3	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Uterus, anterior / Index low	—	3	—	—	—	—	3	3	—	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Uterus, retroverted / Index high	1	3	7	3	—	1	15	9	6	12	11	4	12	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Uterus, retroverted / Index medium	2	1	3	—	3	—	9	5	4	13	8	1	12	1	—	—	—	—	—	1	—	—	—	—	—	—	—
	Total	29	24	42	22	20	17	154	80	74	163	124	30	156	7	0	1	1	—	1	2	2	—	—	—	—	—	—

uterus should be considered in its relation to the pelvic tilt, one feels justified in acceding to the comment made by the Editors of the Year Book in Gynecology and Obstetrics (1928)—"Another operation for the correction of retroversion, added to the already crowded field. Apparently human ingenuity must have an outlet and woman is the sufferer."

In those cases where the operation for retroversion failed, the technic of the operation or the surgeon's skill was not at fault. The bad result was due to the fact that the surgeon failed to appreciate the type of patient he had in hand. Those patients who had congenital retroversion should not have been operated upon. Those patients with acquired malposition are cured, and may be cured by any corrective operation if in addition to the abdominal operation the pelvic floor is properly repaired. The reason for the numerous operations for the cure of malposition is the desire of the surgeon to develop an operation that he hoped would accomplish what the previously existing operations failed to do.

In appreciating the relation of the spine to the pelvis one will be able to account for the existence of the "tipped womb" in nullipara as well as in many multipara. He will not recommend surgical or mechanical correction in these cases. He will understand the reason for the statement that "arched back" is associated with difficult labor. He will also be able to decide whether attempts should be made to prevent malposition of the uterus by the use of pessaries soon after childbirth.

In conclusion I wish to call attention to the following:

1. That there are certain types of women who present anatomic relations between the spine and pelvis that are at variance with the majority of women, and that the uterus assumes a position which is essential or normal to these types of women.

2. The "normal standard" has been accepted only because a large majority of the women are constituted in their physical make-up in a similar manner.

3. Many women who possess a variation in position of the uterus from the "standard normal" of the majority of their sisters, are perfectly normal to themselves. These women conform to a "standard of the minority."

4. That any attempts to correct these variations in position in order to make them conform to a "standard-so-called normal" with the hope of relieving symptoms, will result in failure or may produce new symptoms.

5. While the measurement of the depth of the hollow of the lumbar spine, is not mathematically an exact index, it does serve as a guide in determining the pelvic tilt, with the corresponding uterine position in the several types of women.

6. Uterine position is not a factor to be considered in trying to determine the cause of sterility.

7. From an obstetric viewpoint, the relation of the pelvis to the spine is no doubt a factor to be considered, but other factors such as the size and position of the fetus and the expulsive power of the uterus must also be borne in mind. While "arched back"—heavy anatomic type—patients are of some concern to the obstetrician because the axis of the pelvic inlet is almost at right angles to the perpendicular line of force of intraabdominal pressure, thereby influencing the presenting part at the brim of the pelvis, favoring posterior positions, in this study the number of instrumental deliveries in the heavy anatomic type is comparatively small.

8. That the results of this study have been obtained by personal observations in a fairly large series of cases. If by reporting these observations, others will be stimulated to further research of this problem, with the ultimate result of sparing patients from unnecessary operations, then this task will not have been in vain.

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982 WHITLOCK AVENUE.

Conill, V.:   Contribution to the Study of Tumors of the Tube.   Rev. Espan. de obst. y ginec. **14:** 335, 1929.

The author describes a primary epithelioma of the tube which he discovered while performing a hysterectomy for fibroids and pseudomucinous multilocular ovarian cyst. The tumor was composed of embryonal epithelial cells arranged in the form of solid cords surrounded by young connective tissue. There was no evidence of a previous inflammatory process.

FRANK SPIELMAN.

PELVIC DIATHERMY*

By George Gellhorn, M.D., F.A.C.S., St. Louis, Mo.

THE results obtainable with diathermy have been subjected to considerable discussion. There are some who pronounce them wholly imaginary while others, equally uncritically, claim that they have cured almost any ailment with this method. Even those whose judicious attitude and personal experience entitle them to earnest consideration, feel that "it is impossible to focus the site of heat in any given internal viscus"[1] or entertain "grave doubt" as to "the possibility of raising the temperature 5 to 10 degrees."[2]

Yet, the production of a high degree of heat in a given location within the body constitutes the very nature of diathermy. Therein lies its essential difference from either contact or radiating heat both of which are applied *from without*. A high frequency current of low voltage, by passing through the body or certain parts of it, transforms its electric energy into heat because of the resistance of the living tissues. The localization of heat is determined by the uneven size of the electrodes, for the current flowing from a larger to a smaller electrode, heats the tissues through which it travels, particularly in the neighborhood of the smaller electrode because here the current converges and, becoming denser, increases proportionately in heating power.

This can best be demonstrated in gynecologic diathermy where the outer or "indifferent" electrode of block tin is placed around the waist of the patient while the smaller electrode is inserted into the vagina. Of the various models I have found the Chapman vaginal electrode particularly useful because it snugly surrounds the cervix and completely fills the vaginal fornices. A diagram (Fig. 1) demonstrates that the electric current entering at *a* must needs seek its way through the body to the vaginal electrode *b* and attains its greatest density in the uterus and its appendages. It is an extremely simple matter to prove that the electric current produces considerable heat and that the highest degree of the latter is localized in the uterus and its immediate vicinity. It is only necessary to place a thermometer into both bladder and rectum during the abdominovaginal treatment. I have done this systematically in a large number of cases. I have also carried out these experiments in different hospitals so as to check up my findings, and though the maximum temperature varied somewhat with different makes of diathermy apparatus, the ratio be-

*Read, by invitation, before the American Congress of Physical Therapy, St. Louis, September 8, 1930.

tween the temperature in the vagina and that in bladder and rectum, respectively, was practically the same. As an illustration, I submit Table I.

Table I, to my mind, is very instructive. It proves at once that it is possible to raise the temperature in the pelvis 10 or more degrees, to maintain it at this level and to focus the heat within the uterus and parametria. Here is the peak of the heating process, for in the adjoining organs, though their actual distance is hardly more than 2 or 3 cm., the temperature, on an average, is 1° or 2° lower than in the center. The difference is more marked in the bladder, perhaps because the urine is not a good conductor of heat.
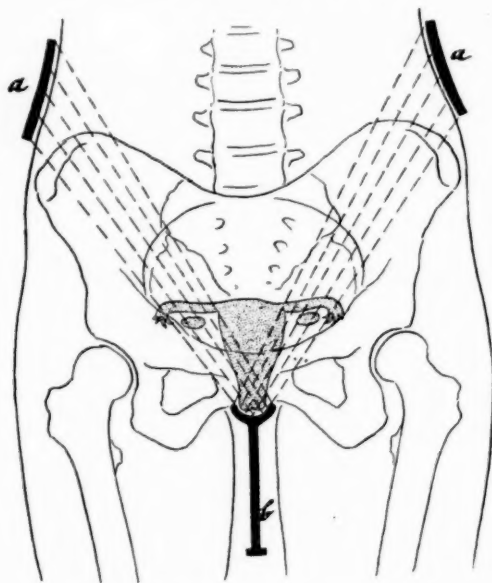
Fig. 1.—(Redrawn from Guthmann.)

Even if the apparatus at present on the market, were able to produce a temperature of 115° in the vaginal electrode, it was considered inadvisable to exceed 112° lest the living cells suffered irreparable harm. This degree was quite sufficient to produce a distinct sensation of internal warmth which, in some cases, even led to profuse external perspiration. The part of the body, on the other hand, which was covered by the outer, indifferent electrode, was neither reddened nor heated.

The heat created in the organs and tissues in the pelvic cavity primarily acts as a stimulant upon the vasodilator nerves within the affected zone. As a result, the blood vessels dilate, and into these vessels rushes a large wave of fresh arterial blood. This serves, in the first place, to cool the tissues and prevent burns and, secondly, to wash away the waste products of former inflammations. The local metabo-

lism which had been retarded by the existing pathologic condition, is thereby restored more nearly to the normal. The new blood may, as Scheffly and Schmidt remark, bring additional leucocytes and antitoxins with it and neutralize bacterial poisons. Absorption and elimination are intensified, and a partial expression of this process is the profuse watery discharge which follows every treatment. Pressure upon nerves by venous stasis is lessened, and this explains the relief from pain which, in most cases, is a prompt and impressive phenomenon.

The possibility, then, of creating internal heat within the pelvic organs and thereby inducing a powerful arterial hyperemia in these

TABLE I. INTERNAL DIATHERMY (VAGINAL)

		Treatment No. I.	Temperature	
TIME	MILLIAMPERES	VAGINAL	RECTAL	VESICAL
11:35	1500	102° F.	101.2° F.	100.6° F.
11:40	2500	106° F.	105.4° F.	104.0° F.
11:45	3000	108° F.	107.2° F.	106.2° F.
11:50	3000	110° F.	109.0° F.	108.0° F.
11:55	3200	110° F.	109.2° F.	108.0° F.

		Treatment No. II.	Temperature	
TIME	MILLIAMPERES	VAGINAL	RECTAL	VESICAL
11:25	2400	106° F.	105.2° F.	104.0° F.
11:30	2500	108° F.	106.2° F.	105.0° F.
11:35	3000	110° F.	107.4° F.	106.2° F.
11:40	3000	110° F.	108.0° F.	107.0° F.
11:45	3200	110° F.	109.0° F.	108.0° F.

		Treatment No. III.	Temperature	
TIME	MILLIAMPERES	VAGINAL	RECTAL	VESICAL
2:50	1200	103° F.	100.0° F.	99.8° F.
2:55	1500	106° F.	103.0° F.	102.0° F.
3:00	2000	108° F.	104.4° F.	103.2° F.
3:05	2500	110° F.	106.8° F.	105.0° F.
3:10	2500	110° F.	109.4° F.	106.8° F.
3:15	3000	112° F.	110.0° F.	109.0° F.

NOTE. No temperatures were recorded until the patient had been under treatment for ten minutes.

structures points to diathermy as a promising method of treatment of pelvic inflammatory disease and superior to other forms of heat application. I may refer here to a previous article[3] in which I have discussed this aspect of the question at length.

I cannot, however, leave the subject without pointing out the limitations of this form of therapy. The possessor of a diathermy apparatus should bear in mind that heat and hyperemia are powerful agents which may be as harmful as they are beneficial if used judiciously and in moderation. Therefore, he should be absolutely certain of his diagnosis before using diathermy, even if it should require consultation with a gynecologic specialist. A painful swelling on bimanual examination is, in itself, not a sufficient indication. To mention but one possibility, he may be dealing with an ectopic pregnancy in which

diathermy would surely hasten the occurrence of rupture. Or other complications such as fibroids may be present where the induced hyperemia would probably lead to increased bleeding. On account of this artificial hyperemia, too, an impending menstruation would contraindicate diathermic treatment for the time being.

Further, the stage of the pelvic inflammation demands attention. In the acute and early subacute stages diathermy cannot be employed. Even in later stages initial caution is always in order, and fever or increased pain may necessitate a temporary discontinuation of the treatment.

An undue extent of an individual treatment must be avoided. Thirty minutes constitute the average duration; for after this time the vasodilator nerves may become paralyzed by the heat, and the result would be a venous stasis, rather than an arterial hyperemia.

In the enthusiasm over a new method, one is only too apt to forget other tried modes of treatment, and it behooves us to make use of all other therapeutic means which have stood the test of time. Above all, the physician must never lose sight of the fact that restitution from any inflammation requires *time*, and that no method however beneficial and ingenious, leads to that short cut to health that every patient hopes for in her own case.

With all these restrictions in mind, one may propose a simple scheme to be followed in the treatment of pelvic inflammations which may be altered or elaborated according to individual experience.

ACUTE STAGE

Rest
Fresh air
Diet and elimination

SUBACUTE STAGE

Rest
Protein therapy
Diet and elimination
Later, diathermy (cautiously!)

CHRONIC STAGE

Protein therapy
Diathermy—alternating with
Firm packing of vagina with glycerine tampons

If carried out patiently and conscientiously, the management of pelvic infections will yield, in the great majority of cases, highly satisfactory results and eliminate, to a large extent, operative procedures which seem to me wholly unphysiological and lead only too often to unnecessary mutilation.

Heat in degrees sufficient to kill bacteria, cannot be used in the human body. The only exception is in the case of gonorrheal infec-

tion, as we know that gonococci are highly susceptible to heat and, in the test tube, are killed at a temperature of 108° F. In the living, the degree of heat must be considerably higher, because the human organism is always intent on maintaining a medium and constant temperature in all organs; and as soon as the temperature rises too much in any one place, fresh cooling blood is despatched to the heated zone to prevent accumulation of heat and consequent burn. The careful work of Corbus and O'Conor[4] has demonstrated that gonococci which may lurk indefinitely in the ducts of Skene and are responsible for most cases of recurrent infection, can be killed by means of diathermy. Several foreign authors (Von Büben, van Putte) have likewise reported signal successes. My personal experience is limited to 4 cases; of these 3, which had resisted all therapeutic efforts, were promptly and permanently cured by urethral and intracervical diathermy.

Table II shows the temperatures obtained in one of the successful cases.

TABLE II. INTERNAL DIATHERMY (URETHRAL)

	Treatment No. I.	*Temperature*		
TIME	MILLIAMPERES	URETHRAL	VAGINAL	RECTAL
10:30	400	108.0° F.	103.2° F.	100.4° F.
10:35	600	110.0° F.	104.8° F.	100.6° F.
10:40	700	112.0° F.	105.4° F.	101.4° F.
10:45	750	112.2° F.	105.6° F.	101.8° F.

10:45 Temperature continued for ten minutes.

	Treatment No. II.	*Temperature*		
TIME	MILLIAMPERES	URETHRAL	VAGINAL	RECTAL
11:12	275	104.0° F.	104.4° F.	100.0° F.
11:17	300	106.0° F.	105.2° F.	100.2° F.
11:22	400	106.0° F.	105.4° F.	100.4° F.
11:27	500	110.0° F.	106.2° F.	100.6° F.
11:32	500	112.0° F.	108.0° F.	101.2° F.
11:37	500	112.0° F.	108.8° F.	102.0° F.

So-called "surgical" diathermy employs much higher degrees of heat for the purpose of destroying tissues, particularly those of a malignant nature. In this respect it resembles the action of the cautery or of fulguration but it has much greater depth effect than either of these methods. Both cautery and the fulgurating spark char the tissues, and the eschar produced acts as a wall which protects the tissues beyond. In diathermy, on the other hand, the heat penetrates into the tissues, and reaches and destroys cancer cells disseminated in the periphery; for it must be remembered that malignant cells quickly succumb to heat. That this is not mere speculation, may be seen from the results obtained by Corbus and O'Conor,[5] and others. The heat penetration can also be measured accurately by placing thermometers into the bladder and rectum. Thus, in a case of a very large cauliflower of the cervix, the temperature in the bladder, within one minute, rose to 102.8°, that in the rectum to 101.6°, though the electro-

coagulation took place in the center of the gigantic growth and at a considerable distance from the vesical and rectal thermometers.

Another way to determine the heat penetration in surgical diathermy is by means of thermocouples inserted into macroscopically normal tissues outside of the growth. Thus we found that nine seconds after commencing the treatment, the temperature in the tissues 5 cm. away had risen 4° F. Still more accurate is the table prepared by Dr. L. H. Jorstad, pathologist to the Barnard Free Skin and Cancer Hospital, who kindly helped me in this work.

TABLE III. THERMOCOUPLE READINGS AND TEMPERATURE DETERMINATIONS

	DISTANCE OF THERMOCOUPLE NEEDLE FROM TUMOR	DEGREE OF TEMPERATURE ATTAINED AFTER ONE MINUTE
Case I. Cancer of Vulva	1 cm.	140.0 F.
	2 cm.	132.8
	3 cm.	131.0
Case II. Cancer of Vulva	1 cm.	120.2 F.
	2 cm.	114.8
	3 cm.	111.2
Case III. Cancer of Vaginal Wall	1 cm.	131.0 F.
	2 cm.	113.0
	3 cm.	113.0
Case IV. Urethral Cancer	1 cm.	122.0 F.
	2 cm.	113.0
	3 cm.	104.0

SUMMARY

Diathermy, despite its youth, has already acquired citizenship in our therapeutic armamentarium. In this paper accurate figures have been supplied which show the exact degree of heat originated within the pelvic cavity and prove conclusively that diathermy can focus heat in the genital organs and there produce and maintain temperatures far above those obtainable with any other method.

As heat creates arterial hyperemia and hyperemia, primarily, counteracts inflammation, the principal field of diathermy in gynecology is in the treatment of pelvic inflammations. This highly beneficial method may, however, become a two-edged sword if clear-cut rules regarding indications and contraindications, dosage, duration, etc., are not scrupulously observed; and it will develop its greatest usefulness only if combined with certain other antiphlogistic means.

To one who has a clear conception of the nature of the inflammatory process, the need for operative intervention in pelvic inflammations will arise only in exceptional cases. Should, however, such an opera-

tion become inevitable, previous conservative treatment carried out systematically and over a sufficient length of time, will render the surgical procedure safer, easier and less extensive.

In chronic urethral gonorrhea diathermy may succeed where other methods have failed to kill the gonococci in the ducts of Skene.

In malignant disease of the female genitals, finally, where the affected tissues are destroyed by electrocoagulation, the deeply penetrating effect of heat may reach scattered cancer cells beyond the original growth.

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Metropolitan Building.

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v. Mikulicz-Radecki and Freund: A New Hysteroscope and Its Practical Application in Gynecology. Ztschr. f. Geburtsh. u. Gynäk. **92:** 13, 1927.

The essayists give a brief outline of the history of hysteroscopy and describe a new instrument. With this instrument in many cases a study of the inside of the uterus is possible. It should be used only by competent men under strictest asepsis.

Contraïndications to its use are: Infections of uterus or vagina, and intrauterine pregnancy. Bleeding is not a contraindication.

The best time for its use is the resting period in the menstrual cycle. The hysteroscope is best fitted to clarify the changes that take place in the endometrium especially during menstruation. Diagnostically it is of value in carcinoma of the corpus, polypi, and submucous fibroids. With the aid of electrocoagulation bloodless sterilization can be performed at the junction of the corpus cavity and the tube.

LESTER E. FRANKENTHAL, JR.

Tietze: Seven Cases of Severe Infection Due to Intrauterine Pessaries. Deutsche med. Wchnschr. **56:** 1307, 1930.

Seven cases are reported with extensive uterine and adnexal inflammation, following the continued use of intrauterine pessaries for contraception. Four of the patients succumbed to the peritoneal extension of the infection and operation. One of them became infected with actinomycosis.

G. E. GRUENFELD.

BREECH PRESENTATION*

BY FRED J. TAUSSIG, M.D., ST. LOUIS, MO.

THE purpose of this paper is not to attempt a review of all phases of this subject but merely to emphasize certain practical points that, through the experience of the past ten years, have led to a change in our management of these cases. At the same time I wish to report briefly on the experience in the handling of these cases during the past three or four years in the obstetric services at the St. Louis Maternity Hospital and the Jewish Hospital, with which I am connected.

The frequency of breech presentation has been given as between 3.2 per cent and 3.4 per cent. At the St. Louis Maternity Hospital there have been 155 breeches out of 4,656 deliveries, and at the Jewish Hospital the incidence of breech deliveries has been 70 out of 2,033. This would total 225 breeches out of 6,689 or 3.3 per cent. The details of these reports will be given later on in the paper.

An analysis of the etiology of breech cases is of value since it may put us on our guard to look for some of the complications that tend to produce this position. In general we can divide these causes into those that interfere with the fixation of the head in the upper portion of the pelvis and those that modify the shape of the uterus. Of the former we have: (1) contracted pelvis, (2) a thick rigid cervix, as in older primipara, (3) placenta previa, (4) multiple pregnancies, (5) hydrocephalus of the child, (6) hydramnion, (7) relaxed abdominal walls. Of the factors producing alteration of the shape of the uterine cavity we have: (1) bicornuate or arcuate uterus, (2) myoma of the uterus. In other words with a normal pelvis, a normal size and shape of the uterine cavity, and a normal single child, the force of gravity combined with the kicking movements of the child will almost always tend to a vertex presentation. In every case of persistent breech presentation a careful analysis of the factors that have produced it may disclose conditions of great value in the further management of the case. I should particularly stress the possibility of contracted pelvis and placenta previa. In some instances an x-ray of the abdomen may throw additional light.

The details of the diagnosis of breech presentation are clearly stated in our textbooks of obstetrics and do not need repetition. The diagnosis is ordinarily not difficult and mistakes are more apt to be made on account of careless, hurried examinations. Might I empha-

size that in our prenatal care we should not be satisfied merely with regular urine and blood pressure tests, but at each ten- to fourteen-day interval time should be allowed in the later months for a careful abdominal palpation and auscultation, together with a rectoabdominal examination of the part presenting over the pelvis. Occasionally in fat women the diagnosis is difficult; here we should have recourse to x-ray.

There are optimistic obstetricians, who maintain that a breech delivery is as easy and safe for mother and child as a vertex delivery. With all due allowance for individual skill and experience, when we deal with a large number of cases, however, the fetal mortality in breech is invariably three to four times as great as in vertex presentation. There is also an unavoidable, slightly increased morbidity and mortality for the mother under such conditions. These increased dangers are primarily due to the fact that in breech cases we cannot accurately estimate the disproportion between the child and the pelvis. In vertex cases we can see whether the head can be pushed down into the pelvic inlet, whereas in breech cases we often fail to recognize such disproportion until near the termination of labor itself. Other factors in fetal mortality are the prolonged pressure upon the cord in the second stage of labor and the necessity for a moderately rapid expulsion of the upper half of the fetal body to prevent asphyxiation.

The recognition of this incontrovertible fact has led many obstetricians in the past to recommend and practice external version during the last months of pregnancy. While this recommendation was made many decades ago it has in the past ten years been the subject of special study and practice and the reports of such men as Ehrenfest, Bartholemew, McGuiness, King, Caldwell, Studdiford and Petrone have materially added to our knowledge of the indication and technic of this procedure. Their experience leads us to the following conclusions: External version, if done without any rough manipulation, is absolutely safe for both mother and child. The fear of premature labors, twists of the cord, or loosening of the placenta have not been justified. It is a procedure that should not be done before the thirtieth nor, except in rare instances, after the thirty-eighth week of pregnancy. The percentage of failures to correct the position runs in the neighborhood of 30 per cent. In a limited number of cases it will be necessary to repeat the external version two or three times, but the incidence of a recurrence of a breech position is not as great as was believed by some men. While McGuiness and Bartholemew have used anesthesia for some of their versions, I personally would be opposed to this, since it might lead to excessive pressure on the uterine contents. In the technic of this procedure the following points should be emphasized: In all difficult cases the patient

should be given a sedative before manipulation begins and should be placed in the elevated hip posture. Then the fingers in the vagina should push the breech up out of the pelvis and with the other hand over the abdomen the breech should be pushed toward the side where the back is situated; holding it at this point the other hand catches the head and with a circular motion pushes it down toward the pelvis. Such rotation of the child in an attitude of flexion has usually been found preferable, but occasionally where this fails, a rotation in the opposite direction may be successful. After rotation has been completed in this manner some men have used pressure by means of pads to either side of the fetus to retain it in the new position. Experience has shown that this is of little value and adds greatly to the discomfort of the patient. On account of the possibility of a recurrence of a breech position it is well to check up on these cases every week or two and in doubtful cases have an x-ray photograph taken to determine the exact position.

Ehrenfest has made an interesting analysis of the outcome of 11 breeches successfully turned compared with 11 breeches which delivered unturned. In only one of the former group did the child die, whereas three of the children in the 11 breech cases died. Although this number is too small to be of great value it tends to point to the value of external version in reducing fetal mortality. While external version, therefore, may be of some help, it does not entirely solve our problem, and we will still have a considerable number of unturnable and undiagnosed breeches to deal with.

Breech presentations can be divided into complete breech, frank breech and footling. A complete breech gives the best prognosis since it uses a large diameter of breech to thoroughly dilate the cervix and yet permits of a ready grasp of one or both legs if assistance is required at the termination of labor. In the frank breech cases, delivery is rendered more difficult by the increased rigidity or splinting of the fetal body by the legs and the difficult of reaching these extremities in case of an arrest of progress. The presentation of the foot or knee, except where it occurs in relatively small twins easy of delivery, is often an unfavorable complication. In a considerable number of such cases we have prolapse of the cord and a tendency to incomplete obliteration of the cervix with its resultant dangers in the delivery of the after-coming head.

In the management of breech cases let me stress first of all the importance of complete effacement of the cervix. Nothing is more troublesome than an attempt to hurry delivery before such obliteration has occurred. In the next place I should stress what might be similarly termed ''effacement'' of the pelvic floor. By this I mean that, particularly in primipara, we should see to it beforehand that we eliminate any material resistance that might lead to serious tears or to an

arrest of progress by the pelvic floor. Some obstetricians have stressed the importance of ''ironing out'' the perineum or pelvic floor muscle. I personally feel that while a certain amount of stretching is permissible, it should not go to the extremes often recommended. Two things are important, one to avoid a tear through the sphincter or rectum and the other to avoid pelvic relaxation after delivery. I am convinced that many cases of relaxed pelvic floor are bound to occur after a complete ''ironing out'' under anesthesia. To me it seems far wiser and safer to stop at this stretching process halfway and then before any danger of submucous tears or fascial separations may occur, make a clean lateral cut either as an episiotomy or in difficult extractions as a perineotomy. Such cut surfaces heal kindly and if properly sutured leave a strong pelvic floor, whereas overstretched or irregularly torn surfaces rarely heal kindly.

To proceed then, having an effaced cervix and an effaced pelvic floor, even a fairly large breech will pass through and be delivered with ease. The golden rule in the management of breech cases is ''push! don't pull!'' The best push, of course, is that exerted by the uterine muscle and the abdominal muscles of the mother, occasionally reinforced by pressure from above made by the obstetrician or his assistant. In uncomplicated cases nothing is to be done until the breech has been expressed up to the umbilicus, then a loop of cord can be drawn down, the back gently turned toward the symphysis and pressure exerted from above to assist the flexion of the head and further expulsion. Usually the head comes down readily in good position without difficulty and the effort is merely to clean the mouth of the child, and avoid the too rapid expulsion of the fetal head. Ordinarily but a few minutes will elapse in such easy cases from the time of the delivery of the breech to the completion of the delivery of the head. In the more difficult cases nature will have to be assisted by pulling down the anterior leg so that the child enters the pelvis with its back toward the sacrum and is then drawn downward until the anterior hip is out of the vulva. The other leg can then readily be extracted and the back of the child gently turned and drawn down until the anterior shoulder lies beneath the symphysis. A finger slipped into the axilla and pressing against the scapula readily brings down this arm. The back now lies toward the symphysis and the other arm brought down by a similar procedure if it has been flexed over the head. It is at this point that special care is needed, no downward traction on the shoulder should be made, rather should an effort be made to push the body back into the pelvis so as to avoid the entrance of the head into the pelvis until after it has been put in a position of flexion. Flexion of the head can best be accomplished by a downward pressure of the finger in the mouth and upward pressure of two fingers of the other hand against the occiput. All of these

procedures must be accomplished without haste, without force, without traction, and without undue twisting of the fetal body. If the delivery of the head or its proper flexion is at all difficult, obstetricians agree almost unanimously that forceps, particularly of the type devised by Piper, should be promptly applied to the after-coming head. Those who have had experience in the use of this instrument speak highly in its favor as an agent in promoting flexion of the head and extraction without undue violence. It certainly should reduce materially the incidence of injury at or about the cervical vertebrae of the child. In frank breech presentations or where there is some difficulty in delivery from a disproportion between breech and pelvis, it seems advisable after complete dilatation of the cervix to push the breech up out of the pelvis under anesthesia and drawing down both legs, proceed with the delivery in the manner already described. There seems no doubt that owing to pressure on the cord in breech cases a prolonged second stage is very much more dangerous to the child than where the vertex presents.

In neglected cases where too long a time has elapsed to permit of the pushing back of a breech we may have to resort to traction by the finger in the groin or, in certain rare instances where the child is already dead, to the use of the hook or fillet to serve as a lever for pulling on the fetal body. These cases should, however, be reduced to a minimum under proper supervision. More and more we have come to realize that in a certain percentage of breech presentations cesarean section is the best method of delivery. This is particularly true of those where the pelvic measurements are below the normal, where the child seems unduly large and particularly in elderly primipara with the breech not engaged in the pelvis. A premature rupture of the membranes in such elderly primiparae will make us more quickly proceed with cesarean section since here we are almost certain to meet with undesirable complications and the life of the child needs special consideration in view of the age of the mother.

Several interesting analyses of breech deliveries have recently been made in this country. The fetal mortality averages somewhere between 8 and 12 per cent. Irving and Goethals out of 235 breech deliveries in ten years at the Boston Lying-In Hospital noted 23 deaths. E. L. King at New Orleans Maternity lost 16 babies out of 159 breech deliveries. DeLee of the Chicago Lying-In Hospital reported 24 fetal deaths out of 250 cases. Caldwell and Studdiford of Sloane Maternity had 36 deaths out of 256 cases. Duncan from the Royal Victoria at Montreal out of 114 breeches had a fetal mortality of only 6. With the exception of the last named, the average fetal mortality is very close to 10 per cent. Our figures were approximately the same. At the St. Louis Maternity Hospital eliminating prematures, macerated fetus, twins, etc., out of 114 breeches there were 10 deaths (8.8 per

cent), and at the Jewish Hospital out of 48 breeches there were 7 deaths (14.5 per cent). Tables I to IV will give additional data concerning these two groups of cases. In the Maternity Hospital figures I should like to call attention to the fact that the ward cases showed a fetal mortality slightly less than the private cases.

TABLE I. JEWISH HOSPITAL CASES

DELIVERIES	BREECH PRESENTATION	MACERATED OR PREMATURE	TWINS	REMAINING
2033	70	9	13	48

TABLE II. ANALYSIS OF 48 REMAINING BREECH DELIVERIES

	NUMBER	FETAL DEATHS	PERCENTAGE MORTALITY
Primipara	22	5	22.0
Multipara	26	2	7.6
Total	48	7	14.5

Jewish Hospital.—Analysis of 7 fetal deaths.

1. Para i, spontaneous easy delivery, died one hour after birth of intracranial hemorrhage.

2. Para iv, footling presentation, cervix not completely dilated, prolonged labor, arms over head, difficult extraction.

3. Para i, frank breech, pelvis simple flat, rupture of membranes at onset of pains, labor fifty-two hours, difficult extraction by pushing up breech and grasping legs.

4. Para iii, footling, preeclamptic mother, external version failed at eighth month, prolapsed cord during labor.

5. Para i, footling, difficult delivery of head, possibly uneffaced cervix, born living but died on fourth day of intracranial bleeding.

6. Para i, funnel pelvis, child weighed 2820 gm., extraction difficult, stillborn.

7. Para i, unsuccessful attempts at external version at eighth month, pelvis normal but breech high, dry labor, forty-five hours, second stage over six hours, arms over head, difficult extraction.

TABLE III. ST. LOUIS MATERNITY HOSPITAL

	TOTAL NUMBER	TWINS	PREMATURE	MACERATED	MONSTROSITY	CESAREAN SECTION	REMAINDER	FETAL DEATHS OF REMAINDER	PERCENTAGE FETAL DEATH
Private Cases	83	5	8	6	1	2	62	6	9.6
Ward Cases	72	12	6	1	1	0	52	4	7.7
Total	155	17	14	7	2	2	114	10	8.8

St. Louis Maternity Hospital.—Analysis of 10 Fetal Deaths.

1. Thirty-three-year-old para iv. Pelvis normal. Rather free hemorrhage with onset of pains. Very rapid labor. Delivered twenty minutes after entering hospital. Child weighing 2600 gm. expelled stillborn, followed at once by placenta. Diagnosed as premature detachment of normal situated placenta.

2. Thirty-five-year-old para i. Normal pelvis, dry labor, frank breech. Child weighing 2775 gm., delivered easily, child died of intracranial injury ten hours after birth. Abdominal walls lax and pendulous, possibly a case favorable for external version in the ninth month.

3. Twenty-five-year-old para iv. Postmature, induced with castor oil and quinine, hydramnion, easy spontaneous delivery. Child weighing 3720 gm. born, showed evidence of subcutaneous hemorrhages over body. Died after twenty-five hours with diagnosis of blood dyscrasia.

4. Thirty-five-year-old para iv. Had one previous normal breech delivery. Original measurement indicated normal pelvis, although measurement taken after delivery showed a simple flat pelvis. After a first stage of twenty-two hours with full dilatation of cervix, breech was pushed back, legs brought down and child extracted with considerable difficulty because of deflected head. Child weighed 2960 gm., could not be resuscitated, showing intracranial hemorrhage at autopsy.

5. Twenty-eight-year-old para i. Pelvis normal, breech high, pains began twenty-eight hours after rupture of membranes, dry, long labor lasting thirty-nine hours. Second stage delayed, 5 hypodermics of 3 drops of pituitrin. Extraction with forceps to after-coming head. Child could not be resuscitated, weighed 3720 gm.

6. Thirty-four-year-old para iv. Normal pelvis at term, membranes ruptured at onset of pains. Cord prolapsed at 4-finger dilatation of cervix. Delivery necessarily rapid. Child stillborn.

7. Twenty-two-year-old para i. Funnel pelvis, tubers 7.5 cm., rapid first stage (nine and one-half hours) but slow second stage (five and one-half hours). Presenting part at vulva for four hours before delivery was begun. Delivery easy with forceps to after-coming head. Fetus cyanotic, could not be resuscitated, although heart beat for one hour.

8. Forty-two-year-old para iv. Pelvis slightly contracted, diagonal conjugate 12½ cm., frank breech, rapid first stage. Attempt to assist delivery by pushing breech up and bringing down legs unsuccessful in out-patient service. Sent into hospital after six and one-half hours second stage. On admission fetal heart beat slow and weak. Child weighing 4260 gm. delivered easily, stillborn.

9. Thirty-year-old para i. Normal pelvis, footling presentation. Rapid first stage, prolonged second stage, child, postmature, weighing 4950 gm., stillborn. Extraction not difficult.

10. Thirty-one-year-old para iii. Frank breech, simple flat pelvis, first stage thirteen hours. After half-hour second stage, attempt to push up breech and bring down legs failed, apparently on account of a contraction ring. At this time fetal heart good. Given morphine hyoscine to relax ring. Fetal heartbeat ceased two hours later. Delivery after four and one-half hours second stage. For demonstration purposes breech pushed up and legs brought down easily and delivery readily completed. Child stillborn, weight not recorded.

TABLE IV. ANALYSIS OF BREECH CASES

	NO.	FETAL DEATHS	PER CENT
Primipara	61	5	8.0
Multipara	53	5	9.6
Total	114	10	8.8

Presentation of Breech: S.L.A., 63; S.L.P., 9; S.D.A., 43; S.D.P., 14; Footling, 13.

COMMENTS

My own comments on the 10 fetal deaths in the Maternity series and the 7 fetal deaths in the Jewish Hospital series are that while some of the deaths were unavoidable (prolapsed cord, prematurely de-

tached placenta, blood dyscrasia), others cannot be entirely excused. These deaths were due as much to faults of omission as of commission. While at times there may have been injury due to too rapid or forceful extraction, there is a definite group where the second stage was unduly prolonged. Prolonged pressure on the cord was here doubtless an important factor in fetal death. Pushing up the breech, drawing down the legs and proceeding with gentle extraction before the child was weakened would probably have given better results. On the other hand I believe that a few hours' test should always be given, particularly when a mature child in breech presentation has previously been spontaneously delivered. Even after such a two-hour test the breech can still be safely pushed back and delivery effected without danger of uterine rupture. In cases of funnel pelvis and in simple flat pelvis, we must more frequently than in the past have recourse to cesarean section, especially if the child is at term and apparently over 3500 gm. in weight.

To summarize then let me emphasize: (1) Careful analysis of all factors that might be causing the breech presentation (especially contracted pelvis, placenta previa). (2) Careful prenatal examinations to insure an early diagnosis and, if possible, a correction of the position by an external version between the thirtieth and thirty-eighth week of fetal life. (3) Reiteration of the doctrine of noninterference in breech cases, "just push! don't pull!" (4) Avoidance of all extraction procedures, whenever possible, until the cervix has been completely effaced. (5) Moderate stretching, followed if necessary by a deep lateral perineotomy, whenever the pelvic floor promises to offer resistance. (6) Avoidance of traction on the shoulders or torsion of the body in delivery to prevent injury to the base of the neck. (7) Application of forceps to the after-coming head whenever simple flexion of the head and pressure from above is not followed by its expulsion. (8) In prolongation of the second stage beyond a fair test, approximately two hours, pushing up the breech, bringing down both legs and proceeding with extraction. (9) Cesarean section in elderly primipara with rigid cervix and whenever pelvic measurements or the progress of labor indicate a disproportion between pelvis and child. Finally, I want to stress that breech delivery requires expert handling when extraction becomes necessary; that in private practice advice should be sought promptly when the second stage is at all prolonged; and that, in maternity hospitals or divisions, ward cases should not be left to the undirected care of the young intern but should be done or directed by men who have had considerable obstetric experience.

3720 WASHINGTON BOULEVARD.

PLACENTA ACCRETA

CLINICAL CONSIDERATION, PATHOLOGY AND MANAGEMENT

BY DAVID FEINER, M.D., NEW YORK
(Attending Gynecologist to the Beth Moses and Israel Zion Hospitals)

I HAVE been prompted to elaborate briefly upon the condition herein described, because of the rarity of this placental anomaly and the high death toll consequent to the failure to recognize the same. Placenta accreta is a definite pathologic entity, with an anatomic and clinical picture peculiar to itself, and not to be confused with the more common complication of adherent placenta; the latter is the result of insertion in the tubal corners or lateral margins of the corpus, or where implantation has taken place on a uterine septum, or more rarely, where there is a large thin placenta of the membranacea type. To be designated as an accreta, the distinguishing factor is the insufficient development or the entire absence of the decidua basalis, thus exposing the muscle of the uterine wall to the erosive action of the trophoblast, and penetration of the villi. This brings about a disastrous fusion of the placenta and the muscle wall, which renders impossible a normal or manual separation of the placenta, because of the absence of a line of cleavage.

A review of the mechanism of placental separation will help to clarify a proper conception of this departure from the normal. Immediately following the delivery of the fetus, the entire uterus with the exception of the placental site, retracts and thickens. The placental separation is then effected within the decidua spongiosa, as originally demonstrated by Langhans. Here, the trabeculae are extremely delicate, and contain the markedly dilated vessels. The hyperemia, ex vacuo, following the expulsion of the fetus, produces a greatly increased influx of blood into this layer. This results in rupture of the above-mentioned spongiosa sinuses and vessels, which are further torn by the folding and puckering of the placenta. The retroplacental hematoma thus formed creates a line of cleavage, and the placenta separates off in the spongy layer of the serotina. In a placenta accreta, however, the histologic study reveals the absence of the serotina with its spongy layer; because of this defect, the villi penetrate the muscular wall of the uterus, and hence the placenta and walls make up one continuous structure and present no line of cleavage. In addition, the involved area of the musculature undergoes destruction as a result of its contact with the invading trophoblastic elements; this, in turn, leads to an excessive thinning of the uterine wall, or in extreme cases, to a rupture of the latter.

Various estimates have been made of the frequency of this complication. Polak places the incidence of accreta at approximately 1 in 6000; B. C. Hirst, 1 in 40,000. Polak reports 4 cases met during an extensive practice covering thirty years. Of these, the first three were treated conservatively, by attempted manual removal, and terminated fatally as result of sepsis. The fourth case, a primipara, seven months gravid, with a complicating large submucous fibroid, recovered following a supracervical hysterectomy. Frankl, in a discussion of this paper, could recall but 6 cases of true placenta accreta, of the immense material encountered in his clinic; and agreed with Polak that the indication is definite for extirpation of the uterus. Out of 36 cases collected by Kraul, only 8 women recovered. A survey of the literature by me has revealed a total of 40 cases reported, in only 20 of which the placenta was examined in situ. Kraul describes 3 cases occurring in a total of 60,000 deliveries during the last twenty-three years at his clinic. Of these, the first 2 were fatal, the third survived a vaginal hysterectomy. Nathanson, in an excellent contribution to this subject, reports 4 cases occurring in a collective series of 75,000 deliveries, placing the incidence at approximately 1 in 20,000. Dietrich quotes the following authors, who, in reporting similar cases, stressed the excessively thinned out condition of the uterine wall: Kworostansky-Meyer Rüegg (fundus, 1 mm. thin); Schwenderer (2 mm.); Bauereisen (3 mm.); E. Martin could palpate the intestines through the thinned out uterine wall; Wegelin (1-3 mm. thin); R. Meyer (in places, ½-1 mm.); Schmidt (in his first case, 4 mm., in his second, ¼ mm.); Schweitzer (1 mm.); in Alexandroff's case, the rupture occurred in the tenth month, and was diagnosed and operated upon the two weeks later. Schwenderer describes a case in which Credé's maneuver led to a rupture of the uterine wall thinned out by placenta accreta.

In the case of a para v, reported by Tennant, it was demonstrated that the placental attachment may not alone penetrate the peritoneal coat of the uterus, but may actually invade the visceral cavity. Schweitzer's case of placenta accreta was at the same time, a placenta previa cervicalis. Jaschke also speaks of the "burrowing" in of the fetal elements into the cervical musculature in low placental insertions. Dietrich reports in detail, the case of a forty-year-old para iv, with a very significant previous history in her four deliveries, including 2 manual removals of the placenta, one febrile puerperium, 2 severe postpartum hemorrhages, and 2 postpartum curettages. In the present delivery, the patient was admitted with mild labor pains, suddenly collapsed, and following version and extraction, died. The autopsy showed a placenta accreta of the membranacea type, with a spontaneous perforation of the uterus, and partial extrusion of the placenta. He calls attention to the fact that a seven-year amenorrhea has existed between the preceding delivery and the case now reported, which he attributes to an atrophy of the mucosa due to an over zealous curettage. This factor has likewise been stressed by other authors (Fritsch, Küstner, Veit, Wertheim), though the ability of the uterine mucosa to restitutio ad integrum, is often remarkable. Dietrich also describes a case of placenta accreta, reported by Baumgart-Benecke, due to an atrophied mucosa, following an amenorrhea of four years' duration (due to atmocausis); because of infection, and scar changes, a Porro-hysterectomy was performed. Similar cases were reported by Holzapfel and Frankenstein, following vaporization therapy.

The etiology is summed up by Polak as dependent upon changes which produce an atrophy or absence of the normal uterine decidua, such as previous manual removal of the placenta, vigorous curettage, endometritis, submucous fibroid, etc. Polak's case occurred in a primipara; of all other cases reported, according to Kraul, only 3, including his own, were para i, the remainder, multipara. The case re-

ported by me is the first of its kind occurring at the Israel Zion Hospital during the past nine years, in a total of 10,000 labors. Another phase of this case worthy of comment is the absence in the previous history of any of the aforementioned etiologic factors.

CASE REPORT

Mrs. P. N., aged twenty-five, one full-term delivery, five years previous, with spontaneous expulsion of the placenta, and no postpartum complications; no history of previous miscarriage or pelvic inflammation. With present pregnancy, estimated date of delivery, March 20. Admitted to Israel Zion Hospital, March 22. First stage, four hours, delivered spontaneously a somewhat mascerated fetus (heart sounds heard four days previously). After waiting one hour for the placenta to
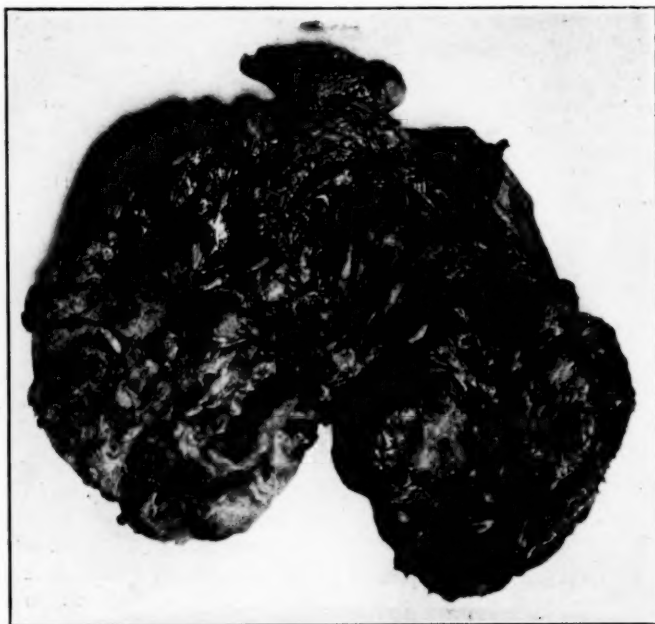
Fig. 1.—Showing gross specimen, with placenta in situ.

separate, the attending physician ventured a Credé expression of the same without result. Following the forcible manipulation, however, the patient began to bleed profusely, and an attempt was made to remove the placenta manually. This was unsuccessful, owing to the fact that the doctor was unable to find any line of cleavage, and recognized the handful of tissue removed as consisting largely of uterine muscle wall. The uterus was packed promptly to control the profuse bleeding. When I saw the patient one-half hour later, she had received 1000 c.c. of glucose intravenously, followed by 750 c.c. of blood to combat the extreme shock. Her condition at this time was somewhat improved as the result of this stimulating therapy, but the pulse was still rapid and thready. Two hours later, she was again put under light ether anesthesia, the packing removed, and under strict asepsis, the interior of the uterus gently but thoroughly explored. The placenta was found spread out over the entire posterior wall of the uterus, but no line of cleavage could be found. A ragged gap was palpable in the left lateral margin, indicating

the site from which the mass of muscle tissue had been dug out. The uterus was again repacked to control the continuous oozing. The diagnosis was obviously placenta accreta, and hysterectomy deemed imperative. Dr. Ralph Beach, in consultation, concurred in this opinion, and advised deferring the operative procedure a few hours until the general condition of the patient improved. Six hours later, a supracervical hysterectomy was performed. The patient made an uneventful recovery, and was discharged from the hospital two weeks later.

PATHOLOGIC REPORT BY M. GOLDZIEHER, PATHOLOGIST TO THE ISRAEL ZION HOSPITAL

Gross.—The uterus was large, yet flabby and collapsed. Its musculature was soft, its surface was covered with smooth, shiny peritoneum. On opening the uterine cavity, its inner surface appeared to be clad with a thin, transparent membrane, which peeled off fairly well from the uterine wall, yet in places it was adherent much more strongly, and these places projected more or less, far into the lumen of the uterine cavity. At one particular place there was an area bulging into
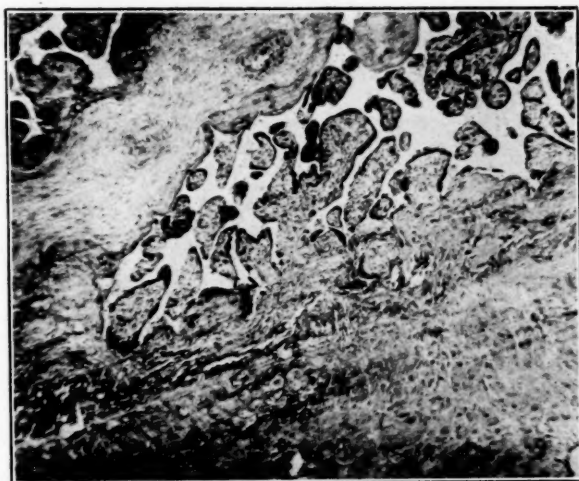
Fig. 2.—Microscopic section, showing the direct contact of the placenta with the myometrium, with the chorionic villi penetrating between the muscle bundles of the myometrium.

the lumen, characterized by deep, bluish-purple color. This bulging nodule was about the size of a goose egg. Other smaller projections resembled the convolutions of the cerebral cortex, but they were all much smaller.

In peeling off the membrane from the cervical portion of the uterus, there was very little tissue of a yellowish-gray color, which connected this membrane with the musculature. Occasionally, however, a few large varicose blood vessels were found, some of which were plugged by dark red clots. Reaching an area midway between the cervix and the fundus there was more and more tissue between the membrane and the uterus proper. This tissue was of a spongy, villous structure and was readily identified as placental tissue. Many varicose vessels were found therein. The bulk of the placental tissue was located in the fundus, and while the peripheral portion of the placenta could be enucleated without much difficulty, higher up the separation became impossible and either placental tissue was left behind or the muscle tissue was torn into.

The musculature of the fundus was considerably thinned out and placental tissue could be seen entering between bundles of musculature as far as approaching the serosa by 2 or 3 mm.

Microscopic.—The placental tissue showed extensive necrobiotic changes, such as breaking up of nuclei or poor staining of the cells with homogeneization of the intracellular substance. Occasionally there was extensive hyalinization, the hyaline taking on various shades of color from pink to yellowish-pink and finally to an almost orange-yellow. These changes were more conspicuous the closer we came to the uterine musculature. In the more distant areas, however, there was a good deal of fibrosis, particularly about the larger blood vessels. Calcification was quite extensive and it seemed that these deposits were also more massive in the vicinity of the myometrium.

There was no sharp demarcation of placental tissue and myometrium. Nitabuch's fibrin stripe could be made out. Projections of placental tissue were penetrating between the muscle bundles of the myometrium, while isolated bundles of uterine muscle tissue could be found surrounded by placental tissue or by yellowish homogeneous masses, such as described above.

The myometrium showed diffuse edema and considerable distention, both of its blood vessels and lymphatics. The top layer of the myometrium showed occasional fibrosis; this newly formed edematous connective tissue coalescing with the homogeneized areas of the placenta.

CONCLUSIONS

1. Placenta accreta is a rare but well-defined clinical and pathologic entity, not to be confused with placenta adherans; the former follows some predisposing condition which leads to an atrophy of the endometrium; the latter, caused by some disturbance in the separating mechanism of the muscle.

2. The presence of placenta accreta is suggested by a failure at separation of the placenta and by an absence of bleeding; this may be confirmed by aseptic exploration of the uterus under anesthesia.

3. Manual removal is impossible and can only result in hemorrhage, sepsis, or perforation. (Polak.)

4. Early abdominal hysterectomy is the only rational procedure as soon as the diagnosis has been established definitely by the failure to demonstrate a line of cleavage.

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875 St. Marks Avenue.

RIGOR MORTIS OF FETUS CAUSING OBSTRUCTION IN DELIVERY, WITH THE REPORT OF A CASE*

By Morris Leff, M.D., New York City, N. Y.

D E LEE states that "this condition is probably common, although it is rarely observed and still more rarely published." Only two other textbooks on obstetrics make any mention of the same.

Mrs. B. G., aged thirty-two, para iii, has one child eight years old. Three years ago she was delivered of a stillborn fetus, which was due to the delay in the delivery of the after-coming head, in a breech presentation.

In her present pregnancy she came under my observation during the antepartum period. Her blood pressure and urine were normal. Her pelvic measurements were: intercristal 30 cm., interspinous 26 cm., external conjugate 20 cm. The outlet was roomy. She was calculated to give birth April 2, 1930. On April 9, 1930, at 5 A.M. she was admitted to the hospital in active labor. Vaginal examination disclosed that the cervix was fully dilated; the membranes had ruptured a short time previously. The head was in midpelvis and presenting in the R.O.P. position. The patient continued to have strong pains, which recurred every two to three minutes, but she did not seem to make progress, and the head persisted in the posterior position. The fetal heart sounds which were regular at first, began to slow down alarmingly with each pain.

At 6 A.M. she was anesthetized and a forceps delivery attempted. As the forceps were applied and slight traction was made, there was a gush of blood from the uterus, which apparently was due to a separation of the placenta. Under the circumstances it was considered advisable to remove the forceps, and to deliver by version instead.

The version was accomplished without great difficulty, but only one leg was brought down, with the foot outside of the vagina. On making traction on this foot great resistance began to be encountered. The uterus was well relaxed, and there did not seem to be present any obstruction which should hinder the delivery. An effort was made to bring down the other leg, but the leg could not be flexed nor the thigh extended so that this attempt had to be abandoned. Traction on the first leg was therefore continued, augmented by pressure on the uterus from above with but little progress. The fetal heart sounds could not be heard at this time. After a great deal of difficulty the groin came in sight, and the soft tissues were found to be ripped open. As no more force could be exerted on that side, the finger was inserted into the other groin in order to make traction on it. With the first pull these tissues also tore through. With further pressure from above the trunk was grasped and was extracted with much effort. The arms and head, however, were delivered with comparative ease.

*Presented before the Section of Obstetrics and Gynecology of the New York Academy of Medicine, November 25, 1930.

At the time of the delivery I had not realized what was causing the trouble. The assumption was that some congenital malformation was causing the obstruction, but there was none to account for it.

When the fetus was examined the cause became evident. The fetus was as stiff as a board. It had gone into rigor mortis, apparently a few minutes after it died when the placenta separated. While the version was being done it was still flaccid, but by the time the leg was brought down the rigor had set in, and further manipulation became impossible. In this rigid condition it could not conform to the curves of the pelvis and therefore could only be extracted with great difficulty.

It was fortunate that the rigor set in after the version was completed, as it would have been exceedingly dangerous and likely impossible to perform the version with the fetus in that state. Every limb became like a metal instrument, liable to cut into the uterine wall, had the bringing down of the second leg been persisted in.

The tissues in the groin did not really tear, but rather broke from the rigidity. I afterward sutured them with number two catgut, but on extending the thigh, the sutures tore through the tissues.

An inspection was made of the cervix and vagina; fortunately there was no damage done, and the patient made an uneventful recovery.

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15 EAST ONE HUNDRED AND ELEVENTH STREET.

Barbanti-Silva: A Pedunculated Fibroma of the Labium Majus Developed from the Extra-inguinal Portion of the Round Ligament. Arch. di ostet. e ginec. 17: 294, 1930.

The author, after a few general remarks on extrapelvic newgrowths of the round ligament, illustrates clinically and histologically a case of pure fibroma of its extrainguinal portion.

Regarding the genesis of these rare tumors, accepting the hypothesis of Laviano, the author believes that either the tumor implanted itself on cicatricial tissue, or that from the beginning it was a fibromyoma and later the muscular fibers were broken and hypertrophied by the connective tissue element.

SYDNEY S. SCHOCHET.
JULIUS E. LACKNER.

Society Transactions

NEW YORK OBSTETRICAL SOCIETY

MEETING OF JANUARY 13, 1931

DR. RADFORD BROWN (by invitation) reported a case of **Tuberculosis of the Corpus Uteri Without Involvement of the Endometrium.** (For original article see page 255.)

DISCUSSION

DR. M. A. GOLDBERGER.—I believe that if a good part of the endometrium is sectioned somewhere a tubercular lesion will be found and that the extension most likely is, first, in the endometrium and then in the myometrium.

DR. G. L. MOENCH.—At the University of Tuebingen 10 per cent of all adnexal disease was due to tuberculosis. I believe with Dr. Goldberger, that probably the endometrium was involved somewhere.

The mode of extension of the tuberculous process is at times interesting. We found, for instance, that if the tubes were involved we would get, sooner or later, a tuberculous peritonitis. On the other hand, if the peritoneum was involved before the genital organs, we would not have an inflammation of the tubes or uterus. That would seem to contradict the usually assumed descending mode of infection, except that Baumgarten, working on the subject, showed that when there is tuberculosis of the peritoneum the fimbriae of the tube became glued together so early in the disease that the tube did not become affected, whereas if the tube was involved there was a reversal of the lymph stream with descending infection of the peritoneum. This knowledge may perhaps at times help us in our therapy.

DR. RADFORD BROWN.—In answer to Drs. Goldberger and Moench, I would say that possibly if every portion of the endometrium had been sectioned we may have found a tuberculous process there, but the endometrium was fairly well gone over and blocks were taken from various portions, near the internal os, the midportion of the body on all sides, from the fundus, and on rather close examination of these there was no evidence found of tuberculosis.

In answer to the question of Dr. Vineberg, I would say that there are reports of primary tuberculosis of the cervix and some of them have been due to tuberculosis in the male where there was a tuberculous orchitis or tuberculosis of the penis.

DR. E. H. DENNEN (by invitation) made a **Presentation of a New Forceps.** (For original article see page 258.)

DISCUSSION

DR. JOHN O. POLAK.—This particular type of forceps has been used at the Methodist Maternity in Brooklyn and is stated to possess all of the advantages of axis traction.

I have always felt that one should become familiar with the application of a particular pair of forceps, the greater his experience the more he can do with the

particular instrument, yet it is impossible that one pair of forceps is applicable to a head in every position and at every level in the pelvis.

Personally I regard the Kielland as a rather dangerous forceps; in my opinion it has only one use, to bring the head into the pelvis when it is arrested in the transverse diameter of the brim—not on a floating head. We teach that the safest time to do forceps is when the head has reached the spines and we feel that patience and pain will do much to bring the head to the spines.

The Barton forceps has a great advantage in parietal presentations and in deep transverse arrests; those who have used them realize how easily the head may be drawn down in these transverse arrests.

The type of forceps which Doctor Dennen has demonstrated is a most perfect mechanical development and in median and low operations has the advantage of giving axis traction.

DR. W. E. CALDWELL.—Dr. Dennen is right in insisting on the axis traction principle in forceps. Too often traction on the handles of the forceps pulls the head laterally, increasing the diameter and pulling against the anterior wall of the birth canal. I believe that the forceps which Dr. Dennen has demonstrated have been designed according to the right principles and are a definite advance since they will do away with traction rods or the necessity of constantly studying the position of the child's head during the delivery.

The Barton forceps has a limited use. Unfortunately the makers have not as yet been able to standardize their manufacture and very few of the models made correspond to the original pair. One pair which I recently saw had a variation of 5 cm. from the original pair, but I think some of the bad results reported with the Barton forceps and the difficulty that some have had in their use may be due to a badly made forceps.

OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING OF JANUARY 9, 1931

DR. JACOB HOFFMAN read a paper entitled **The Effect of Anterior Hypophyseal Implants Upon Senile Ovaries of Mice.** (For original article see page 231.)

DISCUSSION

DR. VIRGIL MOON (by invitation).—This remarkable series of experiments opens up some very interesting biologic problems, conceptions and possibilities. We must understand, however, in attempting to evaluate them that there are certain principles which have not been violated in the experiment, but which we might violate in our conception of the experiment if we are not guarded against this.

We were told that these implants were not successful in the sense of becoming living integral parts of the mouse. They did not become living tissue in the sense that a skin graft does. If that is true, and of course we know it to be true, then whatever effect was produced must have been produced by the substance residing in the anterior portion of the pituitary gland implanted in the mouse. This would suggest that the portion of the pituitary gland implanted became a sort of reservoir which was absorbed gradually into the body and into the physiologic activity of the mouse.

A senile mouse weighs perhaps 18 to 20 gm., the implant weighed perhaps 0.25 gm., a ratio of 80 to 1. A human subject weighing 160 pounds must receive an implantation of approximately two pounds in order to receive an amount of

gland substance proportionate to that used in the experiment. With so large an implant of pituitary gland substance we should expect considerable physiologic excitation!

Such factors will have to be taken into consideration and evaluated when attempting to determine the significance of such experiments. This is not at all intended to minimize the significance of these trials, but simply to offer a warning against too wide an interpretation.

DR. HOFFMAN (concluding).—I think Dr. Moon is probably right, but it will require further study to prove definitely whether or not the activity of these implants, some time after implantation, or whether the primary effect, is the essential one. I believe that they, so to speak, simply set certain latent forces into motion.

DR. B. M. ANSPACH AND DR. J. HOFFMAN presented a paper entitled **Perforating Chorionepithelioma of the Uterus.** (For original article see page 239.)

DISCUSSION

DR. THADDEUS L. MONTGOMERY.—The whole question of chorionepithelioma formation presents an ever-interesting problem, the solution of which is being approached more closely every day. I cannot but feel that we are very near to the discovery of the cause of this malignant growth.

We are learning constantly more and more concerning the hormones which have to do with the nidation and growth of the fertilized ovum. It will not be long before we will be able to so control the operation of these hormones that such conditions as necrosis of the chorionic epithelium or overgrowth of the chorionic epithelium may be produced experimentally.

It would appear that in normal early pregnancy, two factors, one local and one general, are at work to prevent overinvasiveness of the chorionic ectoderm. The local factor lies apparently in the decidual reaction of the endometrium, for wherever the chorionic epithelium meets the resistance of the decidua, a melting down of tissue, the "fibrin layer of Nitabuck" develops. The general resistance results from the reaction of the general maternal organism to bits of syncitial tissue which dislodge from the chorionic layer and pass into the maternal blood stream.

In the normal placenta, such processes are finely balanced, and we find only scattered foci of necrosis of the chorion in epithelium and villi. Departures from this normal balance are found in such conditions as extensive necrosis of the placenta in which the local and general maternal resistance is preponderant and in chorionepithelioma in which the maternal resistance is lowered. In the case of placenta accreta it is evident that the local resistance of the decidual layer is absent but the general maternal resistance to the invasion of other organs is still present.

The cases described by Dr. Anspach present a peculiar phase of chorionepitheliomatous growth, and his report adds to the accumulating knowledge of this singular disease.

DR. ANSPACH (concluding).—The problems that Dr. Montgomery mentioned are of course most interesting. Evidently in the blood or the tissues of every woman who conceives and in whom placenta grows, there is produced a substance that stops the growth of the chorion cells at a certain time and when this normal inhibition is disturbed the proliferation may become abnormal and destructive.

In our case we thought at first because of the hemiplegic symptoms that the patient had a metastasis to the brain. With the most careful study we were un-

able to determine positively whether such a condition really existed. The right-sided symptoms gradually abated but when I last heard of her they had not entirely disappeared.

DR. B. M. ANSPACH AND DR. J. HOFFMAN presented a report of two cases of **Primary Carcinoma of the Fallopian Tube.** (To be published later.)

DR. L. C. SCHEFFEY AND DR. W. J. THUDIUM presented a paper entitled **End-Results in the Treatment of Carcinoma of the Cervix With Radium.** (For original article see page 247.)

DISCUSSION

DR. FLOYD E. KEENE.—The technic which Dr. Scheffey and his associates have used is practically the same as that which we have employed at the University Hospital. Our average dosage has been 2400 mg. hours of radium element applied in the form of capsule and needles. For a long time we have held the view that the primary dose was the one which accomplished the result, but, as Dr. George Gray Ward has demonstrated so clearly, a careful follow-up of these cases is essential and reirradiation employed on the appearance of any lesion suggesting a recurrence.

Dr. Kimbrough is now engaged in checking up our results, but the work has not progressed sufficiently to permit of any conclusions.

In an analysis presented by Drs. Norris and Kimbrough of 262 patients who had been under observation for five years or more, the following results were obtained: There was a total salvage of 12.7 per cent. In the Stage I cases where radium alone had been used, 37 per cent of the patients were alive and apparently well. In the same type of case when a cautery amputation and irradiation had been employed, the five-year salvage was 42.9 per cent. In my opinion a high cautery amputation combined with irradiation should be employed in the early cervical lesions.

DR. BAXTER L. CRAWFORD (by invitation).—Gynecologists have made much progress in handling cases of carcinoma of the cervix and fundus, and it is because of studies of this kind that they have definite data as to the results of various forms of treatment. The proper evaluation of the methods of treatment of malignant disease is being made by other specialists, but very few of the other departments have made as much progress along this line as gynecologists. Another point to be emphasized is that of an efficient follow-up system in handling these cases. This is largely a personal matter because it requires much perseverance and system to show as high a percentage of follow-up as demonstrated in this paper.

DR. THUDIUM (closing).—Dr. Keene has brought up the question of high cautery amputation prior to irradiation. A goodly number were cauterized before applying the radium, especially when a large carcinomatous mass protruded into the vaginal canal.

It is quite evident that improvement in curability statistics is dependent upon early diagnosis. To accomplish the latter persistent efforts in the education of the laity regarding significant symptoms must be continued. Furthermore, we must constantly impress the medical student and the practitioner with the importance of early biopsy in suspicious cervical lesions, in addition to proper prophylactic treatment of the damaged cervix.

Department of Book Reviews

CONDUCTED BY ROBERT T. FRANK, M.D., NEW YORK

REVIEW OF NEW BOOKS

Almost simultaneously two short gynecologies[1,2] have appeared, the one less than 400, the other some 325 pages. This must be a distinct relief to the medical student who hitherto has been burdened by the huge textbooks covering every phase of the field through which it was necessary to wade in order to obtain even a superficial knowledge of the subject. In these columns I have repeatedly urged medical authors to make an effort to compress students' textbooks into sizable volumes in order to make it easier for the student to follow his lectures. Therefore I greet these new arrivals with pleasure.

Curtis' *Text-Book of Gynecology*[1] attempts to give an essentially complete presentation of the subject in concise form. It is based on a record of personal experience. The arrangement of the subject matter differs from the orthodox form. This appears to have some advantages and also many disadvantages. The first section deals with infectious processes. The "cellulitis group" includes abortal and puerperal infections as well as cellulitis of other etiology. The next section covers tumors of the uterus. The subsequent one deals with tumors of the ovary. Succeeding chapters cover displacements and relaxation, disturbances of function, including the gynecological aspects of internal secretions. The next chapters are rather an "omnium gatherum," in that three different sections include special diseases and important symptom complexes, among which are grouped endometriosis, ectopic pregnancy, leucorrhea, fistulas, backache, disturbances of the pelvic veins, and physiology and pathology of the endometrium.

The next section, headed "Other Gynecological Diseases and Symptom Complexes" embraces such variegated subjects as lesions of the cervix, caruncles and prolapse of the urethra, carcinoma of the vulva, pruritis, vaginismus, gynatresia, malformations. The final section which deals with special topics, describes the gynecological patient, the early months of pregnancy, the appendix and large intestine, urinary problems in gynecology, radiotherapy, anesthesia, and postoperative care.

Among the subjects on which the author expresses a very definite opinion, the following may be mentioned. He discountenances active treatment in acute gonorrhea and is extremely conservative in the chronic forms, operating on less than 15 per cent. In hysterectomy, if drainage through the cervix is desired, he bisects it anteriorly. To aid in the diagnosis of endocervical lesions, incision of the cervix is recommended. For the treatment of carcinoma of the cervix, both hysterectomy with liberal removal of the vaginal tube and paravaginal tissues, as well as radium therapy are utilized. It is rather surprising that the author has not encountered a single case of chorionepithelioma in twenty years. In surgical correction of retrodisplacements, Curtis takes rather a radical stand, favoring operation where many gynecologists would not agree. Masturbation he considers as a possible cause of dysmenorrhea. I must disagree in considering corpus luteum cysts a cause of bleeding as in my experience they are more often followed by

[1]A Text-Book of Gynecology. By A. H. Curtis. W. B. Saunders Co., Philadelphia, 1930.

amenorrhea. Few will agree with the author that "A smoothly healed hydrosalpinx encountered at operation may sometimes be left with advantage in case it cannot be removed without considerable effort or without likelihood of disturbing the ovarian circulation—provided always that the patient has had no pain in this region." This refers to patients whose uterus has been removed for fibroid tumors.

The illustrations, most of them from the pen of Tom Jones, are excellent. The entire book is to be recommended to teachers and students because of its brevity, directness, and clear exposition. The short bibliography at the end of each chapter will be appreciated.

C. Jeff Miller has written *An Introduction to Gynecology*[2] contained within 327 pages. It is an elaboration of the short student outline which the author published some three years ago. He limits its field to the use of beginning students and has divided it into sixteen sections which correspond to the sixteen sessions offered to the junior gynecological student. With this in mind only the vital essentials have been included and therapy not touched upon. Brief chapters on embryology, anatomy and physiology of the pelvic organs are given. The physiology of the menstrual cycle is entered into in great detail and Schroeder's conception of the endometrial changes is adhered to. The glands of internal secretion are next discussed, thus basing what follows upon our modern conception of endocrinology. A detailed discussion of the methods of examination and diagnosis of gynecological patients is covered in the next chapter, including laboratory examinations. I cannot agree to the wisdom of emphasizing the salpingography with lipiodol to the medical student. The Abderhalden test for pregnancy might well be deleted from the next edition, and the space now devoted to it added to the paragraph describing the Aschheim-Zondek test for pregnancy.

An excellent description of gonorrhea is offered to the student, excellent both because of its brevity and strikingly clear arrangement. Short descriptions of other inflammatory lesions are included in this chapter, among which are included leucoplakia, although this may not be based on strictly inflammatory etiology.

Chapter V covers inflammations and infections of the genital tract, exclusive of the tubes. It is perhaps a trifle misleading that chronic "endometritis," including hyperplasia, are described in this chapter although emphasis is placed on theory of Hitschmann and Adler in regard to the cyclical changes. Chapter VI deals with the inflammations of the tube in which the entire course, from the acute through the chronic stage, and the resulting residua are set forth with care.

The next chapter is devoted to birth injuries, in addition to which other obstetrical sequelae are featured. The next section takes up malpositions of the uterus, succeeding chapters dealing with neoplasms of the genital tract. The one covering carcinoma of the cervix is very detailed. Students may possibly be confused by the introduction of several histological classifications including that of Schottländer as well as that of Martzloff. An entire chapter is devoted to endometriosis. Ovarian cysts are grouped according to Gardner's classification. The final three chapters cover functional disorders among which is included probably with justice, ectopic gestation.

The entire book is well arranged and gotten up. Students should welcome this introductory work which reduces materially the labor of entering into the, to them, new subject of gynecology. The illustrations are numerous and well chosen. They have all been obtained from diverse sources to whom due credit is given.

—*R. T. Frank.*

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[2]**An Introduction to Gynecology.** By C. Jeff Miller. The C. V. Mosby Co., St. Louis, 1931.

In the April issue of 1930 we had occasion to describe in detail *Factors in the Sex Life of Twenty-Two Hundred Women,*[3] a noteworthy contribution to our knowledge on sex life. It will suffice, therefore, to announce here that this volume has now reached its eighth printing.

—*Ehrenfest.*

This impressive volume, *American Physicians and Surgeons,*[4] of about 1500 pages represents a biographic directory of physicians and surgeons, mostly limiting their work to certain special fields, in the United States and Canada. Its purpose is to serve as source of desired information for the general public, doctors, hospitals, and public libraries. It will help the layman, if a newcomer in a certain locality, to select a reliable specialist, and will aid the physician when called upon to give advice to a patient moving to another city. As assured by the editor the selection of dependable and representative physicians in each locality was done on the basis of impartial study of their records, including scientific publications and official positions now held, and no price was charged for inclusion of any names. Competent to judge particularly the names of physicians mentioned as specialists in gynecology or obstetrics we can assert that in this respect the selection in general seems excellent. A supplement contains a classified list of the leading hospitals, sanitariums and health resorts of both countries.

The book, *The Behavior of the Newborn Infant,*[5] is a summary of very careful work done at Ohio State University as a cooperative enterprise between the departments of psychology and obstetrics.

An objective analysis of the literature and results of former investigators is given in every chapter. The experiments were carried out in a specially constructed cabinet where the infants could be observed under the most detailed controls. The various stimuli were applied within the cabinet and movements and reactions recorded by sensitive instruments built on the outside of the cabinet. The data derived from these experiments are too numerous for a brief review.

The research according to the statement by the authors has produced more problems than it has solved. ''It has suggested the possibility that a complete picture of activity, both quantitative and qualitative may reveal sex and race differences in behavior at this early stage when the environment is more uniform than it will ever be afterward. It has pointed out the futility of assuming that an infant's sensory reactions are similar to those of adults, and has shown that to speak at all confidently on this subject will require intensive experimentation in each sense field, with greater control and analysis of the exact nature and measurement of the physical stimuli. It has shown that a study of adaptive reactions (sucking, reactions to temperature, light, sound, smell, taste, etc.) will probably yield more significant results than the enumeration and description of fairly specific reflexes of little social significance.''

The book is an extremely valuable contribution to child psychology. In the reviewer's opinion it is the first really scientific and thoroughly controlled study. As the authors themselves put it, the work is only the beginning of similar investigations of human behavior. ''The work of the future has to describe the stages through which the infant passes in becoming a participating unit in the social organization.''

—*Paul J. Zentay.*

[3]**Factors in the Sex Life of Twenty-Two Hundred Women.** By Katharine Bement Davis, Ph.D. Harper & Brothers, publishers.

[4]**American Physicians and Surgeons.** Edited by James Clark Fifield. The Midwest Company, Minneapolis, 1931.

[5]**The Behavior of the Newborn Infant.** Karl Chapman Pratt, Ph.D., Amalie Kraushaar Nelson, Ph.D., and Kuo Hua Sun, Ph.D. (Ohio State University Studies), 1931.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

A REVIEW OF THE GYNECOLOGIC LITERATURE OF 1930

BY SYDNEY S. SCHOCHET, M.D., AND JULIUS E. LACKNER, M.D.,
CHICAGO, ILL.

(From the Division of Obstetrics and Gynecology, Michael Reese Hospital)

INTRODUCTION

EMPHASIS in this review of the gynecologic literature of 1930 is placed on the important rôle of chemistry and its subdivisions of molecular physics and biochemistry. It is of special interest to gynecologists to consider the general methods of attack of chemistry on the basic problems of hormones. Progress of greatest significance to the understanding of the perplexing function of menstruation, has been made through the application of chemistry to the study of the female sex hormone. Impressive as is this brilliant discovery (isolation of the female sex hormone) it is well to bear in mind, that the gaps in our knowledge of menstruation are far greater than any success attained, and that, it is a mistake to expect chemotherapy to accomplish more than can be reasonably expected of it in its present development.

The isolation of crystalline folliculin (theelin) will lead ultimately to the determination of its molecular structure and then to its synthetic preparation. In time other undiscovered active substances or hormones will be isolated and the complicated physiologic mechanism of uterine bleeding completely solved. Studies in biochemistry are the outstanding topics in the literature of 1930.

Some of the next great advances will be in molecular physics, and a knowledge of the negative charged atom of radioactive substances, which is now in the realm of the unknowable. It may, perhaps, be of some assistance to point out that Professor Sir J. J. Thomson of the Cavendish Laboratory has shown that the particles of the cathode rays have a mass not more than one-eighteen hundredth part of that of a hydrogen atom. This type of basic knowledge will give us a clearer conception of the effect of irradiation on the molecule and on the effects of roentgen therapy.

Many valuable contributions to the study of menstrual disorders, malignancy, and problems in sterility were made during the past year. Fewer papers on new electrical devices for the treatment of endocervicitis were published due to a more sane and proper evaluation of these procedures.

GENERAL PROBLEMS

It is refreshing from time to time, to pause amid the fruits of our collective labors, and to evaluate the great advances during the past decade. In this field we are particularly concerned with that group of discoveries which seeks to illumine the physiology of menstruation and the great problem of new growths. These camprise only the beginning of the great advances to be made in gynecology. Here lie great possibilities for good or for evil. Progress in the field of gynecology will be stimulated if we maintain a sane appreciation of the discoveries and not consider the biologic facts in a one-sided manner. The biologic point of view, when righly pursued, will elucidate our problems, but when viewed from the surface will confuse, cause chaos, and make our specialty a chemical tragedy.

It is impossible to cause voluntary modification of the sex. Yet Unterberger[1] advocates vaginal douches of bicarbonate of soda to produce male offspring, and the application of lactic acid solutions to the male organ to produce female offspring based on the theory of a variation in the hydrogen content of the vagina.

Brown[2] reviews the great victories gained in the field of gynecology, but rightly concludes that our present knowledge compared to all that can be known is ludicrously slight. The teaching of postgraduate gynecology and an inventory of the undergraduate's knowledge of gynecology are well analyzed and summed up by Dannreuther.[3] It is not the intent of this author to indict the general surgeon as a pelvic and plastic operator, but it is an open question whether his knowledge fits him for duly considering the adaptation of treatment to pelvic symptomatology, the effects of a particular operation on the childbearing function; and the important factors that subsequently influence the patient's psychologic stability and domestic happiness.

More than a thousand papers[4] have been published on the theory of the sedimentation reaction, and its practical applicability to differential diagnosis in adnexal lesions. Like the temperature, the change of rate of the erythrocytic sedimentation is an entirely nonspecific reaction of the organism. The increased rate of sedimentation is an agglutination phenomenon, that is due to a complex of factors of which the most important are chemical changes in the proteins and lipoids of the plasma; change in antibody contents of the serum; changes in the viscosity and surface tension of the blood; the size of the red blood cell; and several other factors which are not known. The increase in the sedimentation rate seems to express change in the plasma proteins toward coarse dispersion. Increases in fibrinogen and the amount of serum globulin which are associated among the decomposition products in cell disintegration, increase the sedimentation rate. In infections, the increased rate is due partly to the effect of bacterial toxins on the active mesenchyma, and partly to cell disintegration with the resulting change in plasma proteins toward coarse dispersion. Michael Nielson[5] in a very careful and systematic study of the sedimentation test concludes that it is a diagnostic measure of essential significance in the differential diagnosis between tuberculous and nontuberculous salpingitis; adnexal infections and tubal abortions with slight or no intraperitoneal hemorrhage. It should be borne in mind that a single test is only of little value and that serial tests, on the other hand, will as a rule give valuable information.

In 34 cases of ectopic pregnancy studied by Jackson,[6] the sedimentation test was slightly increased in 24; and markedly increased in 10 cases. Baer and Reis and other investigators feel, that the rate of sedimentation gives more reliable information than the white count. This view has been concurred in by Wystrom and Greisheimer[7] in a study of 57 gynecologic patients by the Cutter and Linzenmeier methods. Dodds and Telfer[8] found this test of limited value in obstetrics and of no value in the differential diagnosis between pelvic abscess and ectopic pregnancy, or in the diagnosis of malignant conditions. From a study of 102 cases of cancer, Adams-Ray[9] concludes that the sedimentation reaction does not give a reliable basis for judging operability except in the cases in which it is very high; it then indicates an inoperable tumor.

From our observations we have been led to believe that the sedimentation test is of greater clinical value and significance than we attributed to it in our previous reviews.

In a well summarized study of morbidity and mortality following pelvic surgery, Dannreuther[10] reviews 1,000 cases. The author reports a morbidity of 7.9 per cent and a mortality of 1.9 per cent. This paper presents an excellent outline of postoperative treatment, and a concrete analysis of morbidity.

The electrocautery is employed by the general surgeon for removal of tumors and for other surgical procedures. Gynecologists have failed to accept this innovation for the apparent reason that this non-cutting method produces extensive necrosis for a wide area about the line of incision. Gottesman and Ziegler[11] have studied the effect on animals and conclude that there is extensive necrosis and that the incision heals slowly with frequent suppurations.

Kolischer[12] describes the value of diathermy in gynecology and rightly cautions against extravagant claims concerning its efficacy and the results obtained in gonorrheic infections. This is an excellent résumé of the subject of diathermy.

Baldwin[13] outlines the methods of prevention of adhesions and sums up the teachings of good abdominal surgery in a word, peritonealization. In experimental work with amniotic fluid, Giordanengo[14] found that it does not prevent postoperative peritoneal adhesions, but causes a reaction analogous to heterogenous proteins. In cases of submucous fibroids it is not infrequent that menstrual blood is refluxed into the peritoneal cavity with the formation of peritoneal adhesions. Candela[15] describes a case of hemoperitoneum. Surgical scarlet fever is not an uncommon condition, and yet it is very striking that only a comparatively few cases have been reported following abdominal operations. Greenhill[16] collected 32 cases in the literature and added eight unreported cases which occurred in Chicago.

Although numerous papers have been published on the innervation of the uterus since the epochal work of E. Kehrer and Waddell yet there still appears to be a divergence of opinion as to the true innervation of the uterus. Dyreff[17] offers a very admirable dissertation on this subject and emphasizes the antagonism between the parasympathetic systems.

Pain in the lower quadrant is often erroneously attributed to the pelvic organs. Rubenstone[18] cites many cases in which the referred pain was due to the sacroiliac joints. Lesions of the vulva with pru-

ritus ani and anal fissure are readily corrected by local injections of alcohol, anesthesin and ether according to the work of Gabriel.[19] (We have not had such successful results.)

Gonococcal bacteremia with localized areas of infection is best treated surgically according to Wheeler and Cornell.[20] (Surgical intervention is not undertaken in our services in the presence of an active acute lesion except in cases where drainage of abscesses [posterior-colpotomy] is indicated.)

In a series of systematic studies Murphy and Goldstein[21] have conclusively shown that postconception radiation produces a high percentage (33 per cent) of gross deformities in the offspring. These studies have been confirmed in another group of experiments on the albino rat in which Murphy and de Renyi[22] find that there was a clubbing of feet or absence of toes in 5 of the 34 litters. This condition seldom occurs in nonradiated animals. Deformities of the extremities were reported in 5 per cent of fetuses in women irradiated during pregnancy.[21] This condition should not be confused with preconceptional pelvic irradiation, as no known effect on the development of future offspring was found by Findley.[23] Six cases of pseudomyxoma peritonei are reported by Mason and Hamrick[24] due to mucocele of the appendix. Old inflammation of the appendix appears to be a large factor in the production of mucocele. Brady[25] calls attention to the not uncommon occurrence of extraperitoneal lesions that are frequently confused with lesions of pelvic organs.

Alfieri[26] gives a systematic analysis of operations in the Gynecologic Clinic of Milan; 1192 cases of celiotomy and 50 vaginal operations were performed with a mortality of 3.6 per cent, and a direct mortality of 2.36 per cent due to the operations. (These statistics are very similar to ours and to the findings of the larger clinics in America.)

We are indebted to Spirito[27] and a group of other Italian workers[28] for studies on the reticulo-endothelial system of the pelvic organs. Volpe[29] finds that the serum of pregnant women produces a reaction in this system which is most marked in eclamptics. (There is little doubt that we have underestimated the importance of the reticulo-endothelial system in the defense mechanism of the pelvic organs.)

Stein and Arens[30] report their studies of pneumoperitoneum in 470 cases; in 150 iodized oil was employed. The authors report no untoward results in their series. There is an interesting case of perforation cited by Stein[31] in which the uterus was penetrated by a crochet needle in an attempted abortion.

ANESTHESIA

Since the advent of anesthesia[32] various agents and combinations of them have been employed and favored by enthusiasts for each type. Recent advances in methods and agents have popularized ethylene, a safe anesthetic but which does not produce quite so complete a relaxation as ether. (Although this is an important factor to gynecologists we have been rather slow in drawing practical conclusions from these facts. We believe that local infiltration and spinal anesthesia are the ideal anesthetics for gynecologic surgery.)

Falls[32] presents a very careful study of local and infiltration anesthesia for gynecologic cases and concludes, that it is the method of

choice in noncomplicated and in carefully selected complicated cases; and that nearly every type of gynecologic operation can be done under local anesthesia when reinforced by scopolamine and morphine. Arcieri[34] finds that a successful local anesthesia of the ganglion of Frankenhäuser and of the internal pudendal nerve is sufficient to perform any operation on the cervix, vagina, and perineum.

A comparative study of anesthetics for surgical operations has convinced Gellhorn[35] that local infiltration anesthesia is safer than inhalation narcosis. Gellhorn reports 82 vaginal hysterectomies under infiltration anesthesia with three deaths. Only one of these can be attributed to the operation or anesthetic.

At The Mayo Clinic[32] intravenous sodium-iso-amyl-ethyl barbituric acid (sodium-amytal) has been used in over 700 cases without a mortality. Mason and Baker[36] present an extensive review, and describe the technic of intravenous use of sodium amytal. The authors conclude that there are no contraindications to the use of this drug except in cases of extreme shock, uremic coma, diabetes or respiratory obstruction.

Rectal administration of avertin is reported by Young[37] as an ideal anesthetic when supplemented by the inhalation of ether, gas and oxygen. The author records no ill effects in 345 unselected hospital and private cases. Lundy[38] has employed this new general anesthetic with good results. Franken[39] observed that avertin lowered the respiratory function by about 40 per cent for two hours following its introduction. The use of avertin narcosis without proper facilities for administering carbon-dioxide is characterized by the author as negligence. (We have had no personal experience with this anesthetic but our reaction to the reports on avertin convinces us that it is still in the experimental stage.)

It is evident that we should not be limited in the selection of an anesthetic in gynecology any more than we would employ a fixed type of operation for all cases of prolapse. In the aged or debilitated patients a general anesthetic is often contraindicated either by lesions in the kidneys, heart and blood vessels, or by disturbances of a metabolic character. For this group of cases local or spinal anesthesia involve less danger and are ideal methods. We have used spinal anesthesia in a very large group of cases with only a few minor complications. However, there have been numerous fatalities published following this procedure. Statistics from clinics in which spinal anesthesia is used routinely show a much lower death rate than those from hospitals where this method is used only occasionally. In a discussion of this subject before the Society of Surgery in Paris in 1923-24, there were mentioned ten deaths due to spinal anesthesia in 20,267 cases. Koster and Weintrob[40] report 6000 general surgical cases with 6 deaths from spinal anesthesia.

Iason, Lederer and Steiner[41] have studied the spinal fluid eighteen hours after spinal anesthesia and found a definite pleocytosis in 11 of 14 cases; and an increase of 37.3 per cent of the spinal fluid sugar. The authors conclude that the pleocytosis indicates a certain amount of irritation of the serous lining of the subarachnoid space. Nelson[42] believes that leakage is an important factor in the postpuncture headache. In a study of the effect of spinal anesthesia on cardiac output, Burch and Harrison[43] conclude that the heart and venous return are

affected secondarily and the symptoms are comparable to primary shock or collapse. Campbell,[44] King,[45] and Jones[46] conclude that spinal anesthesia is an ideal anesthetic for abdominal operations. In operations for cancer of the rectum, Jones found that the surgical procedure would be much more difficult and in some cases (obese patients) impossible without spinal anesthesia.

Sacral anesthesia in gynecology has not received the attention this method deserves. Wong[47] believes that sacral, epidural, extradural or caudal anesthesia is the safest and best method of producing local anesthesia in the regions of the sacral nerves. The reviewers have employed spinal anesthesia in cesarean sections and find that there is no greater danger either to mother or child than with local anesthesia. Featherstone[48] is also of the opinion that spinal anesthesia has an important place in the technic of cesarean section. Intraspinal injections do not inhibit the contractions of the uterus, but Bourne and Burns[49] concluded that they interfere with full uterine relaxation between the pains.

BREASTS

A review of the gynecologic literature would be incomplete without reference to the breasts. These organs are modified sweat glands and accessory glands to the organs of reproduction. Their activity at birth is due to the presence of the female sex hormone in the fetal blood (Schochet, Lackner and Gustavson). The physiologic function is greatest during lactation, pregnancy and the menstrual period in the order named. Bainbridge[50] believes that there is a definite relationship between intestinal toxemia and abnormal changes in the breast.

Ultraviolet irradiation has been tried on the breast to increase the lactation, but contrary to reports in the literature, Küstner and Borner,[51] were unable to increase the flow of milk in 21 lactating women. Ries[52] cites a case of abscess formation in the breast following lipiodal injection into the milk ducts. Three cases of fat necrosis of the breast attributed to disturbances of the endocrine organs are reported by Brancati.[53]

While syphilitic lesions do not occur very frequently in the internal organs of reproduction they are occasionally found in the mammary glands. Primary lesions on the nipple, or gummas may occur. Akaiwa[54] describes a case of gumma of the breast which occurred eleven years after the primary infection.

Prolapse of the breast containing nonmalignant nodules is not uncommon. This condition is due to the present fashion in dress. Farrar[55] concludes that plastic operations are unnecessary mutilations and that the prolapse can be corrected with proper uplifting support if the treatment is instituted before there is marked sagging of the breasts.

GENITOURINARY SYSTEM

The epithelium of caruncles of the female urethra shows enough infolding to make its benign character seem doubtful to one not familiar with its structure. Olcott[56] found compound acinar glands in the urethra of 17 out of 23 cases and believes that they may be an important factor in the formation of caruncles. (This description is at

variance with the common teachings of pathology. Caruncular growths are papillary angiomas and occasionally contain tubular glands described by Gebhard.)

Irritability of the bladder during the climacteric is a reflex neurosis due to overstimulation of the sympathetic nervous system, and, according to Lindenberg[57] responds to calcium and organotherapy.

Uroselectan is a safe method of determining a normal or diseased condition of the genitourinary tract in the pregnant and nonpregnant states.[58] According to Ottow[59] it is a valuable adjunct in the diagnosis of the fistulas of the ureter, in determining whether transplanted ureters are patent, and useful in cases where it is impossible to make a pyelogram by ureteric injection. Van Duzen[60] examined cystoscopically various types of cystocele and frequently found a separation of the vesical fascia and injury to the trigone. Gottlieb[61] treats small vesicocervical and vesicovaginal fistulas with electrocoagulation. According to Ottow[62] only the smallest fistulas with the least amount of scar formation will heal with this procedure. If the first attempt at electrocoagulation is not successful, it is useless to repeat this procedure. In the treatment of vesicovaginal fistulas, Fornero[63] completely mobilizes the bladder and dissects the prevesical fascia from the vaginal wall. (We believe that surgical procedures are par excellence in the treatment of vesicovaginal fistulas.)

Kahn and Walker[64] advise a cystoscopic examination previous to any elective gynecologic operation. (This routine procedure is overemphasized.)

Ligature stones of the female bladder are infrequent since the more common use of absorbable sutures in place of linen, silk, or silver, which cause incrustations. Ottow,[65] like many others, has found infected sutures from pelvic operations penetrating the bladder wall. The diagnosis was made cystoscopically, and removal of the stitch cured the cystitis. In operations performed in close proximity to, or involving, the bladder wall, Craig[66] warns against postoperative distention. Bissell[67] agrees with Grelonsky[67] that most bladder hemorrhages, which follow rapid emptying of a distended bladder, are due to chronic lesions of the bladder wall rather than to the sudden emptying of the overdistended organ.

Subsequent to every implantation of the ureter, Stoeckel[68] suggests a cystogram and an intravenous pyelogram to determine the operative result. He cites a case in which a reflux was not diagnosed previous to the employment of the above procedure.

For severe incontinence, Smith[69] advises a plastic on the sphincter urethrae, with the interposition operation. Newman[70] has devised a very ingenious method of inverting the uterus and using the cervical and uterine canal as an urethra where the entire floor of the bladder was extensively torn and the urethra completely lacerated.

For thirty years Stoekel[71] has encouraged gynecologic urology and emphasized the importance of a study of the urinary organs. During the past twelve years, he has operated upon 50 cases of tuberculosis of the genitourinary organs; 10 pyo-, and 2 hydronephroses; 12 cases of kidney stone; 4 kidney tumors; 12 cases of bladder stones; 4 bladder resections; 11 bladder tumors; 51 bladder fistulas, and 45 cases of incontinence.

EXTERNAL GENITALIA

According to R. Schroder[72] vaginal bacteria change their morphologic forms with the variation in degree of acidity. Acidophilic bacteria (such as Döderlein's bacilli) in weakly acid secretion, change into cocci, and chained cocci may alter their form and become diplococci or short bacilli or even diplococci. The vagina is kept acid by the sugars secreted into the vagina. If the high acidity is interfered with the vaginal flora changes. On account of its acid reaction, the vaginal wall withstands infection well. (These observations differ from the accepted teachings in bacteriology.)

Dierks[73] is of the impression that the parallelism of cyclical changes in the vagina and in the uterine mucosa is the result of hormone action. According to Geist[74] there are individual differences in the vaginal cycle as also observed in ovarian and uterine cycles. Temple, Stein, and Schochet[75] have shown that there are rhythmic contractions in the vagina which are effected by the menstrual cycle.

Arnold[76] reports a case of Vincent's disease of throat and vagina complicating an agranulocytosis. This is the only authentic case of this sort recorded in the literature during the past thirty-five years. The fusiform bacilli and spirilla are different forms in the life cycle of this organism. Ottow[77] describes a case of vaginitis with ulceration, and membrane formation complicating agranulocytosis.

Mathieu[78] noticed that the trichomonas vaginalis lost its motility when in contact with hexylresorcinal and reports some gratifying results with hexylresorcinal in the treatment of this condition. Kleegman[79] suggests pyroligneous acid (full strength) with Lassar's Paste pack as the best form of treatment. Furniss[80] feels that daily 1-4000 bichloride of mercury douches (also during the menstrual period) give the best results. (Before we know the method of introduction of the trichomonas into the vagina, we can never assure our patients that they will not have recurrences. Apparently every author has his own favorite treatment for this condition. One of us [Schochet] does not consider the trichomonas a pathogenic organism.)

In the treatment of gonorrheal vaginitis, Herrold, Hoffman and Blatt[81] employ the intracutaneous injections of first and second generations of live gonococci at weekly intervals. Within four to six weeks, they report, 80 per cent of the cases were free of gonococci and thus clinically cured. Brown[82] reports 118 cases of gonorrheal vaginitis, 46 of which were discharged cured. The average period of treatment was sixty-seven weeks. Andreitschuk[83] introduces pure cultures of Bacillus vaginalis into the vagina in his treatment of vaginitis. In a series of 35 cases, 20 were cured, 13 improved, and in two there were no changes.

Iribarne and Sardi[84] record success in the treatment of pruritus vulvae with radioactive mud. Polzl[85] uses vaginal suppositories of irradiated fats in the treatment of leucorrhea and claims considerable success. (We question the value of either procedure.)

Maxwell and Van Gorder,[86] in a very interesting paper, describe an operation for the relief of compression of the vagina due to osteomalacia. In these two cases marital relations were impossible. The operation involves the removal of the descending ramus of the pubes, the ascending ramus of the ischium, and part of the ischial tuberosity

on the left side. The stability of the pelvic girdle was not endangered nor was there a subsequent disability. (This operation indicates great ingenuity.)

Sarcoma of the vagina is rare. McFarland[87] collected 101 cases from the literature in 1911. According to Tracy[87] a large percentage of the cases is found in childhood as sarcoma botryoides; 31.8 per cent develop during the second year of life; and 60 per cent were in adults.

Stoeckel[88] gives a very thorough and detailed résumé of the treatment of carcinoma of the vulva. In the past he had cauterized the growth, then made an incision from one anterior superior spine to the other, dissecting out all fat and superficial and deep glands, circumcising and removing the vulva at the same time. He strongly recommends the dissection of glands from the periphery toward the tumor with the removal of skin and tumor in toto. He advises against resection of the healthy urethra in these cases. The objections to this operation are the time factor (one and one-half to three hours), the danger of infection, and the later trophic disturbances in the skin. Of cases reported in German literature that were treated with radium and x-ray, 11.9 per cent were cured for a five-year period. With the radical operation, 27 per cent were cured for five years. Stoeckel[88] suggests the following treatment in future cases: Treat the primary tumor with radium, remove the glands radically by operation, and radiate the lower abdomen. If the primary tumor is refractory to radium, then radical removal is indicated. The recurrences to be treated with electrocoagulation. The incidence of cancer of the vulva can be reduced 50 per cent by timely removal of a precancerous lesion. Taussig[89] advises a complete vulvectomy with the removal of the lymph glands for carcinoma of the vulva.

Hinselmann[90] noticed an increase in the number of papillae in leucoplakia. Rogge[91] feels that the differential diagnosis of leucoplakia from carcinoma is extremely difficult, for leucoplakia is precancerous. (An experienced pathologist can differentiate carcinoma from leucoplakia.) In inflammatory diseases, in which the process remains progressive in spite of conservative or surgical treatments, one should suspect actinomycosis of the vulva. Martins and Schugt[92] advise roentgen therapy and the oral administration of iodides for this disease, which always has a grave prognosis. (The vulva, with its exposure to skin germs and its proximity to the three great excretory orifices of the body, exhibits surprisingly little pathology. This is apparently due to a local immunity of the vulval region.)

Miller[93] is of the opinion that the present treatment for the various pathologic conditions of the vulva is far from satisfactory. Retention cysts of Bartholin glands are discussed by Lehmann.[94]

Haun[95] reports a case of multiple cysts of the vagina due to inflammatory processes which Meyer[95] classifies as fibroadenomatous endometrial growths.

The important principles in the treatment of vesicovaginal fistulas, outlined by C. Jeff Miller,[96] are free accessiblity, visibility, separate sutures for bladder and vagina, the use of silver wire, and the pre- and postoperative treatment.

Bjorkenheim[97] reports six cases of rectovaginal fistulas operated upon. The most difficult case was a fistula situated high up in the

left fornix of the vagina. This was repaired by the combined abdominal and vaginal method advocated by Legeicu.

Kirschner and Wagner[98] prefer the skin flap in making an artificial vagina. With the use of the intestine the authors fear incontinence, fistulas, and strictures. Frankenberg[99] used the sigmoid for making an artificial vagina and reported four successful operations out of five. He prefers the sigmoid to the small intestine which Baldwin suggests, because its blood supply is not interfered with, because the sigmoid secretes less mucus and is more distensible than the small bowel.

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Correspondence

TREATMENT OF FORCEPS MARKS IN THE NEWBORN

To the Editor.—When I was a house officer in the Lying-In Hospital, I was impressed by the number of babies who, after difficult forceps deliveries, were left with abrasions, contusions, and lacerations of the scalp and face. Ultimately, I was allowed to do forceps deliveries and found that I, too, caused similar injuries. These injuries are always a distress to a physician and, it is needless to say, to the parents as well, for, although you can assure the parents that most of the marks will disappear, some of them take a good while to do so and others leave permanent disfigurements.

One baby who was much marked by a pressure groove running from the cheek to the scalp caused me so much anxiety that I was unwilling to hand him to the nurse without attempting to do something. Therefore, I kept him in my lap and began to massage the deep grooves left by the forceps. To my surprise, I found that after four or five minutes of treatment the marks practically disappeared. During the rest of my house officer's service, I experimented with every baby who had marks following a forceps delivery by me or under my supervision. In some instances, I treated one side of the face and not the other. I found that the side treated appeared normal on the next day, while the side untreated became discolored and maintained its marks practically during the stay of the child in the hospital. In cases where the skin had actually been cut through, the untreated areas left . permanent depressed scars while the treated areas healed by first intention and disappeared. In a case where there had been possible nerve injury so that the baby's eye did not close normally, circulation was restored and pressure on the nerve was apparently relieved by this friction so that at the end of the treatment both eyes opened and closed normally and equally. During years of practice since then I have continued to use this method and have advised those men associated with me to practice it.

Immediately after the baby is delivered, the cord tied, and the uterus controlled by the nurse (even before the expulsion of the placenta), the baby receives my attention. If there are any forceps depressions, depressed contusions, or scarring, the injured area is rubbed gently but firmly with a wet sponge. The vernix caseosa acts as a lubricant so that the gauze does not cause undue friction on the skin. Firm massage is continued for four or five minutes until all of the depressions have disappeared and the skin has resumed a normal appearance, although a little redder than the unfrictioned skin. If any actual cuts in the skin are present, I paint them with 2 per cent mercurochrome solution.

I believe that if this method of treatment was applied to every baby having superficial forceps injuries of the head and face after delivery, physicians would be saved a good deal of distress, the parents a great deal of worry, and the babies themselves would be permanently benefited.

HILBERT F. DAY, M.D.

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Item

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American Board of Obstetrics and Gynecology

REPORT OF ANNUAL MEETING AND EXAMINATION,

PHILADELPHIA, JUNE 6, 1931

The American Board of Obstetrics and Gynecology held the second section of its first examination of applicants for certification at Philadelphia, June sixth, prior to the annual meeting of the American Medical Association. The first or written examination was held on March fourteenth in various cities of the United States and Canada, and this latter was the oral or clinical examination before the entire Board.

Seventy-four applicants reported for examination, and of this number sixty-nine qualified and five failed to pass.

A limited number of applicants were approved at this meeting without examination. In granting such approval preference has always been given to men who are heads or associates of teaching departments in obstetrics and gynecology in Class A medical schools, or are Fellows of one or both of the two national special societies sponsoring this Board. Exceptions to the above have occasionally been made for outstanding reasons.

The Board has now voted to abolish entirely as of December 31, 1931, all further certification under Group I classification of applicants, i.e., without examination because of eminence in the specialty.

The parent organizations of this Board, namely, the American Gynecological Society, the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, and the Section on Obstetrics, Gynecology and Abdominal Surgery of the American Medical Association, feel certain that its activities under their direction will rapidly exert a more and more profound influence in improving the standards of specialization in these branches. It is to be expected that the certification of the obstetrical and gynecological specialist by this Board and its list of diplomates will soon be a generally and widely used means of distinguishing between those who are well qualified in their claim of being specialists and those who are not.

Notices of time and place of future examinations will appear in various medical journals. It is urged that all qualified obstetricians and gynecologists make application as soon as possible.

Information and application blanks may be obtained from the Secretary, Dr. Paul Titus, 1015 Highland Building, Pittsburgh, Pa.

List of Diplomates Approved by the American Board of Obstetrics and Gynecology, at Philadelphia on June 6, 1931.

Almy, Thomas, Fall River, Mass.
Andrews, C. J., Norfolk, Va.
Aranow, Harry, New York, N. Y.
Behney, C. A., Philadelphia, Pa.
Bickel, D. A., South Bend, Ind.
Black, W. T., Memphis, Tenn.
Bristol, D. J., Jr., Boston, Mass.
Broder, N. E., New York, N. Y.
Burch, L. E., Nashville, Tenn.
Clifford, J. S., Rochester, N. Y.

Cogan, G. E., Hartford, Conn.
Conoway, W. P., Atlantic City, N. J.
Cosgrove, S. A., Jersey City, N. J.
Cowles, G. E., Wichita, Kansas
Darnall, W. E., Atlantic City, N. J.
Davis, G. H., Brooklyn, N. Y.
Edwards, E. A., Chicago, Ill.
Ely, W. C., Philadelphia, Pa.
Fischman, E. W., Chicago, Ill.
Fox, Paul C., Oak Park, Ill.

Frankenthal, L. E., Jr., Chicago, Ill.
Gardiner, John P., Toledo, Ohio
Gibson, Gordon, Brooklyn, N. Y.
Goldberger, Morris A., New York, N. Y.
Good, Frederick L., Boston, Mass.
Goodman, Sylvester, J., Columbus, Ohio
Grier, Robert M., Evanston, Ill.
Guffey, D. C., Kansas City, Mo.
Gustafson, G. W., Indianapolis, Ind.
Hagstrom, Henry T., Brooklyn, N. Y.
Heffernan, Roy J., Boston, Mass.
Hellman, Alfred M., New York, N. Y.
Hershman, Abram A., New Haven, Conn.
Hesseltine, H. C., Iowa City, Ia.
Hornstein, Mark, New York, N. Y.
Huntington, James L., Boston, Mass.
Hyams, Mortimer N., New York, N. Y.
Jackson, D. L., Boston, Mass.
Jacobs, J. Bay, Washington, D. C.
Janney, James C., Boston, Mass.
Jarcho, Julius, New York, N. Y.
Jones, H. O., Chicago, Ill.
Judd, A. M., New York, N. Y.
Kickham, Edward L., Boston, Mass.
Kimbrough, Robert A., Philadelphia, Pa.
Knipe, W. H. W., New York, N. Y.
Kocyan, Joseph J., Wilkes Barre, Pa.
Krigbaum, Roy E., Columbus, Ohio
Lash, Abraham F., Chicago, Ill.
Lazard, E. M., Los Angeles, Calif.
Lewis, R. M., New Haven, Conn.
Lilienfeld, Michael C. C., New York, N. Y.
Lobsenz, Moses, New York, N. Y.
Lubin, Samuel, Brooklyn, N. Y.
Lynch, Frederick J., Boston, Mass.

McCullough, Francis J., Philadelphia, Pa.
McMahon, J. J., New York, N. Y.
Manley, James R., Duluth, Minn.
Mencken, Harry P., Astoria, L. I., N. Y.
Miller, Julius A., New York, N. Y.
Miller, Norman F., Iowa City, Iowa
Miller, Theodore, Cleveland, Ohio
Moore, W. G., San Francisco, Calif.
Mount, Walter B., Montclair, N. J.
Murray, Peter M., New York, N. Y.
Pemberton, F. A., Boston, Mass.
Philip, Albert, New York, N. Y.
Pierce, James M., Ann Arbor, Mich.
Potter, Milton G., Buffalo, N. Y.
Proctor, I. M., Raleigh, N. C.
Raymond, Walter C., Johnstown, Pa.
Roblee, Melvin A., St. Louis, Mo.
Robinson, M. R., New York, N. Y.
Rosenfeld, Samuel S., New York, N. Y.
Sage, Earl C., Omaha, Neb.
Schauffler, Goodrich C., Portland, Oregon
Sears, Nathan P., Syracuse, N. Y.
Shay, Edward F., Fall River, Mass.
Smith, Philip H., Evanston, Ill.
Stander, H. J., Baltimore, Md.
Stevenson, James W., Pittsburgh, Pa.
Storrs, Ralph W., Hartford, Conn.
Taylor, James S., Altoona, Pa.
Thompson, Hartwell G., Hartford, Conn.
Tracy, S. E., Philadelphia, Pa.
Truex, Samuel L., Middletown, N. Y.
Walker, Robert B., New Brunswick, N. J.
Weiner, Morris, Denver, Colo.
Wilens, Ira, New York City

The next written examination for applicants for Certificate from the American Board of Obstetrics and Gynecology will be held in the following cities on Saturday, October 31, at 2 P.M., under the direction of the examiners and assistant examiners of the Board.

New York City
Chicago
Philadelphia
Toronto, Canada
Indianapolis, Ind.
Portland, Oregon
Rochester, Minn.
Iowa City, Iowa
St. Louis, Mo.

Boston, Mass.
Ann Arbor, Mich.
Baltimore, Maryland
Atlanta, Ga.
Cincinnati, Ohio
San Francisco, Cal.
Grand Forks, North Dakota
Denver, Colorado
Galveston, Texas

The examination will consist of ten questions on obstetrics and gynecology; is for Group III candidates and must be accompanied by fifty case records. Group II candidates are not required to take this examination nor to provide case records, and notice of the next oral and clinical examination for all applicants will be published at a subsequent date. For further information and details apply to the Secretary, Dr. Paul Titus, 1015 Highland Building, Pittsburgh, Penn.

Books Received

HORMONE DES OVARIUMS UND DES HYPOPHYSENVORDERLAPPENS. Von Dr. Bernhard Zondek, Professor der Geburtshilfe und Gynaekologie an der Universitaet Berlin. Mit 121 zum Teil farbigen Abbildungen. Berlin. Verlag von Julius Springer, 1931.

ARZNEI-, DIAETETISCHE, ETC. VERORDNUNGEN fuer die Gynaekologisch-geburtshilfliche Praxis. Von Professor Paul Strassmann, Universitaet Berlin. Fuenfte, umgearbeitete und erweiterte Auflage. Leipzig. Verlag von Georg Thieme, 1931.

EASIER MOTHERHOOD. By Constance L. Todd. New York. The John Day Book Co., 1931.

STILL-BIRTH AND NEONATAL DEATH IN INDIA. By Christine J. Thomson, M.D., Ph.D. London, H. K. Lewis & Co., Ltd.

LES DIAGNOSTICS ANATOMO-CLINIQUES. Appareil Genital de la Femme. Premier Partie. Par P. Moulonguet et S. Dobkevitch. Masson et Cie, editeurs. Paris, 1931.

STUDIEN ZUR FERTILITAET. Von Professor Dr. G. L. Moench, New York Post Graduate School and Hospital. Mit 24 Abbildungen und 14 Tafeln. Verlag von Ferdinand Enke, Stuttgart, 1931.

INDIKATIONEN ZUM ABDOMINELLEN KAISERSCHNITT. Von Geheimrat Professor Dr. Georg Winter in Koenigsberg. Verlag von Ferdinand Enke, Stuttgart, 1931.

DIE HORMONALE STERILISIERUNG DES WEIBLICHEN ORGANISMUS. Von Professor Dr. Ludwig Haberlandt. Mit 6 Abbildungen im Text. Verlag von Gustav Fischer, Jena, 1931.

BECKENVERBINDUNGEN DES MENSCHEN mit besonderer Beruecksichtigung von Schwangerschaft, Geburt und ihren Folgen. Von Dr. Walter Putschar. Mit 66 Abbildungen und 9 Tabellen. Verlag von Gustav Fischer, Jena, 1931.

MUTTERSCHAFTS-FUERSORGE. Von Dr. Max Hirsch, Berlin. Verlag von Curt Kabitzsch, Leipzig, 1931.

ERGEBNISSE DER MEDIZINISCHEN STRAHLENFORSCHUNG. Herausgegeben von H. Holfelder, etc. etc. Band V. Mit 396 Abbildungen im Text. Verlag von Georg Thieme, Leipzig, 1931.

HANDBUCH DER INNEREN SEKRETION. Herausgegeben von Dr. Max Hirsch. II. Band, Lieferung 9. Altern und Verjuengung von Professor Dr. Romeis. Verlag von Curt Kabitzsch, Leipzig, 1931.

LEHRBUCH DER GYNAEKOLOGIE. Von Professor Dr. W. Stoeckel in Berlin. Dritte, neubearbeitete Auflage, mit 466 Abbildungen und 65 farbigen Tafeln. Verlag von S. Hirzel, Leipzig, 1931.

DIFFERENTIAL DIAGNOSTIK IN DER PAEDIATRIE. Von Dr. Walter Pflueger in Stuttgart. Verlag von Theodor Steinkopff in Leipzig, 1931.

PRATIQUE OPÉRATOIRE DES ANNEXES DE L'UTÉRUS. Par Raoul Charles-Monod. Avec 87 figures dans la texte. Editeurs, G. Doin et Cie Paris, 1931.

TROUBLES FONCTIONNELS DE L'APPAREIL GÉNITAL DE LA FEMME. Par professeur Gaston Cotte de Lyon. Deuxième edition, revue, corrigée et augmentée. Editeurs, Masson et Cie, Paris, 1931.

THE CHEST IN CHILDREN. By E. Gordon Stoloff, Mount Sinai Hospital in New York. Publishers, Paul B. Hoeber, Inc. New York, 1931.

Corrections

In the July issue, page 64, the article by Melvin A. Roblee, ''Treatment of Cervicitis by Cautery and Electrocoagulation,'' the author's degrees should read B.S., M.D., instead of B.S., M.S.

In the May, 1931, issue, page 644, in the article by A. W. Rowe, ''Some Functional Criteria of Normal Pregnancy,'' in Table III, under the group ''Gain Per Week'' the figure under column ''C'' should read, 0.54; and the figure under column ''Average'' should read, 0.46.